

Acute Therapy Systems

**The multiFiltrate system:**  
Your choice for optimal therapy



**FRESENIUS  
MEDICAL CARE**

# The multi**Filtrate** system at a glance



- Simple handling, flexible and reliable. Ideal for continuous renal replacement therapy.
- Ci-Ca®: Ideal for patients with risk of bleeding.
- Simple use with appropriate treatment kits.
- User-friendly operating concept with self-explanatory menu guides.
- multiDataLink for connection to external patient data management systems (PDMS): access to treatment data always available.

- High quality standards in production and service ensure trouble-free operation. Alarms limited to safety-related situations.

#### **You have the choice:**

- **Heparin or citrate anticoagulation – multiFiltrate Ci-Ca® offers both options.**
- **Disposables tailored to your treatment – saves costs.**
- **Our experienced staff and tried-and-proven training concept support you with initial and ongoing training.**

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With acute renal failure, the highest level of quality is necessary



**The multiFiltrate system:  
flexible, effective  
and reliable**



The multi**Filtrate** system is easy to operate and flexible in therapy: your reliable partner for continuous renal replacement therapy. The multi**Filtrate** product range includes kits that meet your needs for:

- **CVVH**
- **Pre-Post CVVH**
- **CVVHD**
- **CVVHD EMiC®2**
- **Ci-Ca® CVVHD**
- **Ci-Ca® CVVHD EMiC®2**
- **CVVHDF**
- **MPS**
- **HP**
- **SCUF**

**Special features:**

- User-friendly operating concept with self-explanatory menu guides.
- Fully-integrated citrate anticoagulation management makes especially long and heparin-free dialysis treatment possible.

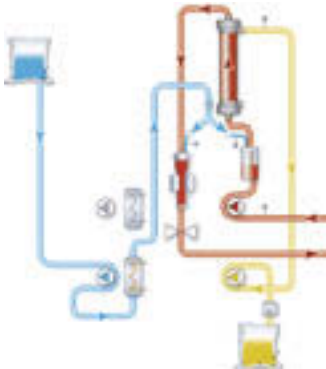
Special therapy options are available for paediatric intensive care units:

- **paed CVVHD**
- **paed CVVH**

Even very small patients can be treated safely thanks to reduced-volume disposables and adapted treatment settings.

# The multiFiltrate system assists you with all therapies

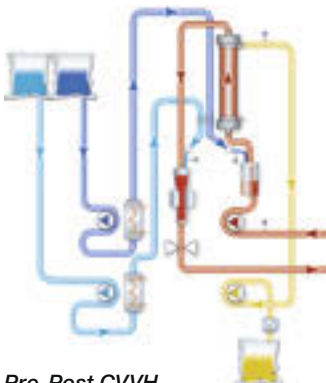
The combination of optimally-coordinated treatment programmes, solutions, disposables and accessories make multiFiltrate a true multi-talent for many applications.



## **CVVH**

*Continuous venovenous haemofiltration*

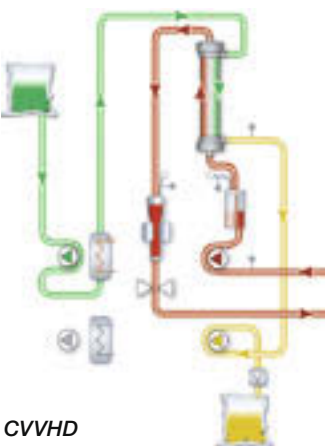
**CVVH:** for continuous venovenous haemofiltration, the filtrate is removed from the blood convectively with Ultraflux® AV filters. The fluid removed is replaced in pre- or post-dilution with haemofiltration solutions.



## **Pre-Post CVVH**

*Pre-Post continuous venovenous haemofiltration (high volume)*

**Pre-Post CVVH:** significantly higher convective volume exchange, up to 9.6 litres/hour, is achieved by high-volume Pre-Post CVVH. Substitution of haemofiltration solution takes place simultaneously in pre- and post-dilution.



## **CVVHD**

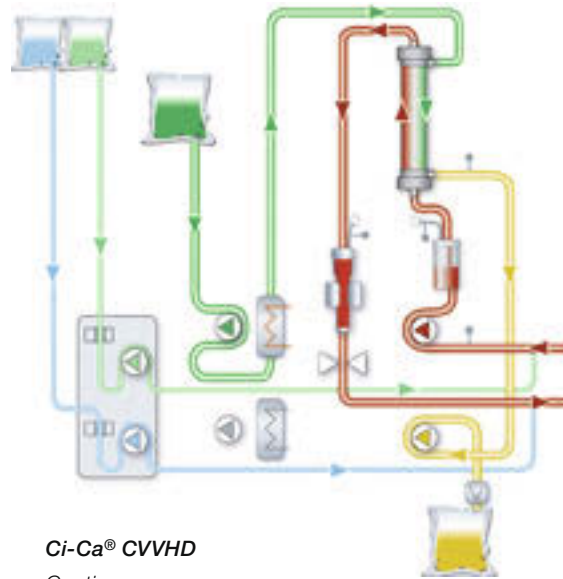
*Continuous venovenous haemodialysis*

**CVVHD:** CVVHD provides effective diffusive elimination of small and middle molecular substances, even with low blood flows (e. g. 100–120 mL/min).

**CVVHD EMiC®2:** the integration of Ultraflux® EMiC®2 in CVVHD therapy increases middle molecular clearance (e. g.  $\beta$ 2-microglobulin, interleukin 6, myoglobin) and may even exceed CVVH performance.

**Ci-Ca® CVVHD:** integrated, regional citrate anticoagulation. Citrate binds ionised calcium and inhibits many steps of the clotting cascade. Thus, effective anticoagulation and long filter patency is achieved. Plus, the patient's acid-base status can be selectively controlled.

**Ci-Ca® CVVHD EMiC®2:** a therapy combining the advantages of CVVHD and citrate anticoagulation with improved removal of middle molecules.

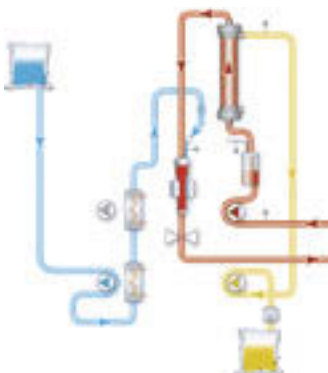


**Ci-Ca® CVVHD**  
Continuous venovenous haemodialysis with citrate anticoagulation



**CVVHDF**  
Continuous venovenous haemodiafiltration

**CVVHDF:** CVVHDF treatment combines the benefits of diffusive and convective elimination of toxic substances, offering effective elimination of small and middle molecular compounds. The substitution can take place in pre- or post-dilution.



**MPS**  
Membrane plasma separation

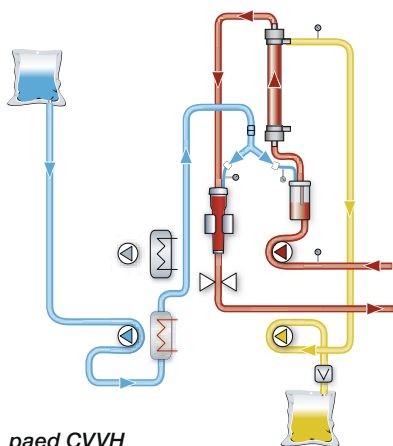
**MPS:** the patient's plasma is separated by a membrane filter and replaced by, for example, donor plasma.



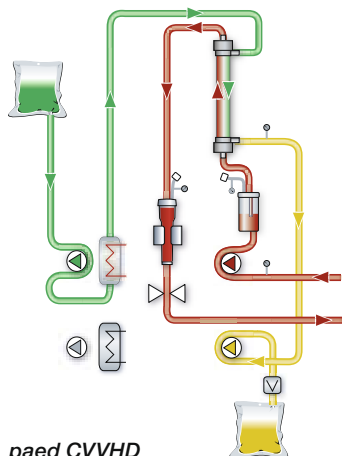
**HP**  
Haemoperfusion

**HP:** haemoperfusion is used for the adsorptive elimination of toxic substances from the blood using a whole blood adsorber.

# Many benefits for optimal paediatric therapy



**paed CVVH**  
Paediatric continuous  
venovenous haemofiltration



**paed CVVHD**  
Paediatric continuous  
venovenous haemodialysis

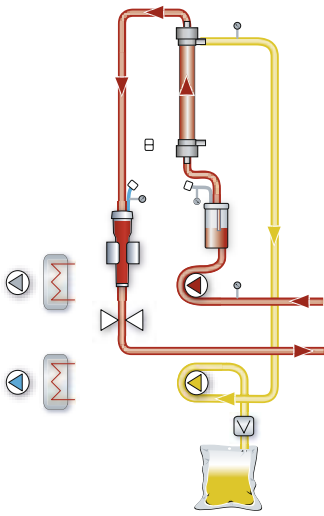
**multiFiltrate paed CRRT:** for the treatment of babies and small children. Continuous renal replacement therapy can be carried out in CVVH (pre- or post-dilution) and CVVHD mode. The extracorporeal blood volume is only 72 mL (AV paed set + Ultraflux® AV Paed).

### Parameters for paediatric treatment

Parameters	min	max	Increments	Unit
Blood flow	10	100	2	mL/min
Ultrafiltration	Off/5	500	5	mL/h
UF target	Off/10	5,000	10	mL
Heparin (cont.)	Off/0.1	25	0.1	mL/h
Dialysate flow	100	1,500	10	mL/h
Temperature	Off/35	39	0.5	°C



# Many benefits for optimal SCUF therapy



**SCUF**  
Slow continuous ultrafiltration

**multiFiltrate SCUF:** slow, continuous ultrafiltration ensures gentle drainage by slowly removing ultrafiltrate. An Ultraflux® haemofilter is combined with reduced-volume tubing lines in order to achieve very low ultrafiltration rates.

**Parameters for SCUF treatment**

Parameters	min	max	Increments	Unit
Blood flow	10	100	2	mL/min
Ultrafiltration rate	100	1,200	10	mL/h
UF target	Off/50	10,000	50	mL
Heparin (cont.)	Off/0.1	25	0.1	mL/h



# multi**Filtrate** Ci-Ca<sup>®</sup> therapy – excellent safety for your patients<sup>1,2</sup>



For patients with high risk of bleeding, controlled regional citrate anticoagulation is an optimal solution. multi**Filtrate** Ci-Ca<sup>®</sup> therapy ensures fully-integrated citrate anticoagulation management.

### The benefits:

- Reduced risk of bleeding complications as compared to systemic anticoagulation procedures (e.g. heparinisation).
- Balanced calcium levels, as calcium management is supported by coupling calcium flow to filtrate flow.
- Allows targetted control of the acid-base status.
- Ci-Ca<sup>®</sup> therapy can be combined with the EMiC<sup>®</sup>2 filter enabling enhanced middle molecule clearance.

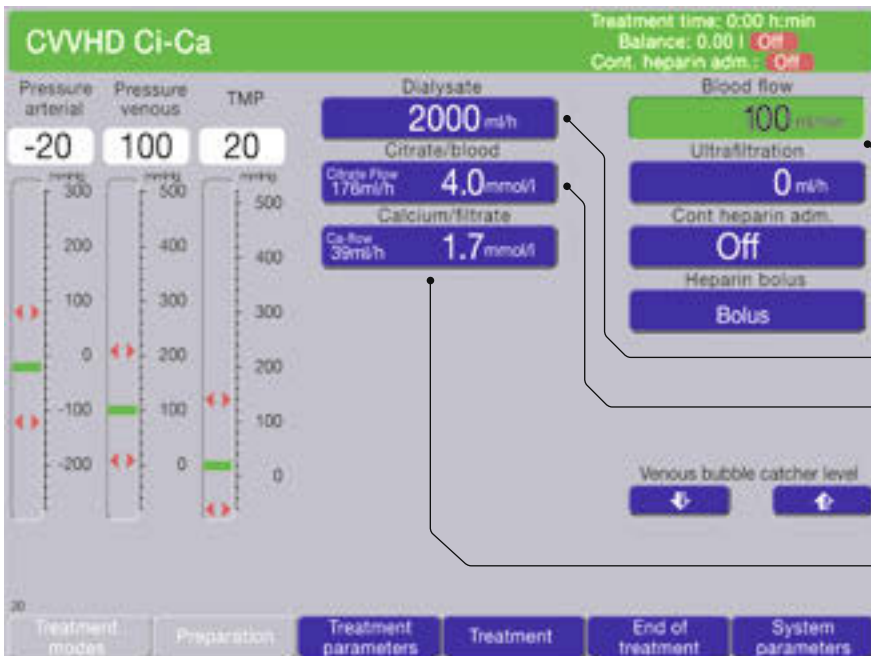
You can rely on multi**Filtrate** Ci-Ca<sup>®</sup> therapy:

- Dependable control of anticoagulation with automatic coupling of citrate administration to extracorporeal blood flow.
- Reduced clotting risk for effective treatment with few treatment interruptions.
- Automatic flow balancing in accordance with citrate and calcium infusions.

This makes venovenous renal replacement therapy effective and truly continuous.

### Literature

- 1 Morgera S, Schneider M, Slowinski T, Vargas-Hein O, Zuckermann-Becker H, Peters H, Kindgen-Milles D, Neumayer HH: A safe citrate anticoagulation protocol with variable treatment efficacy and excellent control of the acid-base status. Crit Care Med 2009; 37: 2018-2024
- 2 Joannidis M: Regional citrate anticoagulation – Finally on its way to standardization? Crit Care Med 2009; 37: 2128-2129



**Blood and dialysate flow**  
→ Acid-base status setting

**Citrate dose**  
→ Regional anticoagulation setting

**Ca dose**  
→ Ca balance setting

Display screen of multiFiltrate Ci-Ca® during treatment showing stored starting values

# Simple handling – more time for your patients

The ergonomic design with self-explanatory menu controls is especially user-friendly. Navigation through the menu points is made easy thanks to a multi-function dial.

Step-by-step screen instructions lead the user through the preparation phase.

## Simple handling due to:

- Cassette system for blood and filtrate tubing.
- Colour-coded tubing systems.
- Ci-Ca<sup>®</sup> module for regional citrate anticoagulation.

Not only do the physician and nursing staff benefit in daily routine, but above all, the patient benefits, too.

## The multiFiltrate Ci-Ca<sup>®</sup> contains:

- 6 roller tube pumps.
- 2 integrated heating systems for solutions.
- 1 integrated heparin pump.
- 1 robust and highly accurate weighing system.

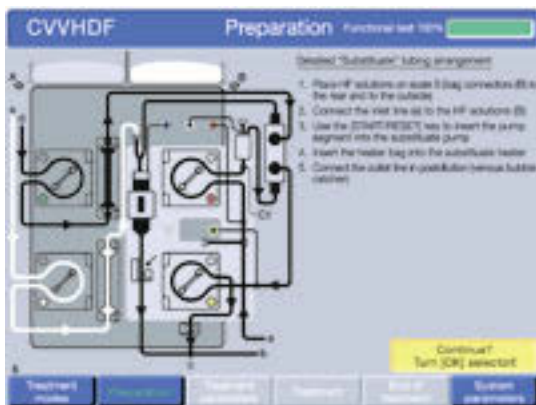
The scales can be loaded with up to 24 kg of fresh substitution or dialysate solution. This considerably reduces the number of bag changes needed and therefore reduces workload.



multiFiltrate cassette



Dialysate tubing arrangement



Substitute tubing arrangement



Complete tubing arrangement



Treatment menu



High-resolution  
LCD colour display

Multi-function dial

**Reliable, even in difficult situations**

In the case of an alarm, the multiFiltrate assists you in finding possible causes, automatically. It makes reasonable recommendations on how to address the fault as quickly as possible.

Up to 3,500 treatment-related parameters and events can be stored during treatment.

**Arterial pressure**
?

- Arterial pressure too low
- Outside alarm limits

Cause/Remedy: select [?]  
Acknowledge with [START/RESET] key

Alarm message

**Arterial pressure**
X

- Verify catheter position
- Arterial blood line kinked
- Check arterial pressure transducer (red) / not dry: if necessary, replace pressure return line with hydrophobic filter
- Blood clots in catheter/cannula
- Blood pump rate too high?
- Rinse catheter/cannula

Possible cause for alarm

# Track treatment at all times using multiDataLink

You can easily connect the multi**Filtrate** to the IT network and patient data management system (PDMS) in your hospital. This allows you to transfer treatment settings automatically to the IT network.

For example:

- Patient or case ID.
- Therapeutic procedures and times.
- Balance data and flows.
- Pressures and pressure limits.

## The benefits:

- Quality assurance with assessment of treatment data.
- Detailed documentation, such as display of individual fluid balances.
- Data retrieval at multiple locations using network interfaces.

### multiDataLink

#### Technical details

RJ-45 interface

XML data format

Cyclical or event-based sending of data

Can be fitted on all multi**Filtrate** devices

Patient/case ID



# Reliable technology and service



The multi**Filtrate**-System is reliable. The system is backed by proven, mature technologies and experienced people with know-how gained in the field. This makes multi**Filtrate** robust, and treatments less susceptible to interruption. High quality standards in production and service ensure trouble-free operation.

## Advanced technology means:

- Programmed pre-set therapy settings.
- Intelligent and intuitive user interface.
- Patient blood detection using an optical blood sensor.
- Precise fluid balance monitoring (with balance accumulated since last reading).
- Pressure monitoring of the entire extracorporeal circuit.
- Effective integrated temperature control.
- Reliable operation, optimised for use of central venous catheters.
- Structured alarm handling with integrated help functions.
- Emergency stop for immediate halting of all pumps.

## Complex system, simple service

The multi**Filtrate** is as simple to maintain as it is to use. Diagnostic programmes specific to the device as well as our well-trained technicians assist in maintenance. Special maintenance actions guarantee above-average equipment availability. This saves you costs and ensures satisfaction.

# Technical data

<b>Dimensions and weight</b>	
Height	175 cm
Width	55 cm
Depth	60 cm
Weight	approx. 100 kg
<b>Electrical supply</b>	
Voltage	100/120//230/240 V AC ±10 %, 50/60 Hz
Current consumption	3.2 A (230 V)
Lead acid battery	18 V / 3.4 Ah, maintenance-free
Emergency operation duration	about 15 min
<b>Electrical safety</b>	
Type of protection against electrical shock	Protection class I
Level of protection against electrical shock	Type CF (100–240 V, 50 Hz)
<b>Flow rates (depending upon treatment procedures)</b>	
Blood flow	10–500 mL/min
Substitute flow	100–9,600 mL/h
Dialysate flow	100–4,800 mL/h
Ultrafiltration rate	0–1,800 mL/h
Citrate dose (citrate/blood)	2.0–6.0 mmol/L blood
Calcium dose (calcium/filtrate)	0–3.0 mmol/L filtrate
<b>Balance</b>	
Number of scales	4
Measurement principle	gravimetric
Load capacity per scale max	12 kg
Resolution per scale	1 g
Linearity deviation max	± 1%
<b>Heating</b>	
Substitute temperature	up to 39 °C
Dialyser fluid temperature	up to 39 °C
<b>Equipment/function</b>	
Screen	10.4", TFT-LCD
Event storage	stores up to 3,500 events
Service menu	Settings via the screen

<b>Arterial pressure</b>	
Display range	–280 to +300 mm Hg
Precision	±10 mm Hg
<b>Venous pressure</b>	
Display range	–80 to +500 mm Hg
Precision	±10 mm Hg
<b>Transmembrane pressure</b>	
Display range	–60 to +520 mm Hg
Precision	±10 mm Hg
<b>Pre-filter pressure</b>	
Measurement range	–50 to +750 mm Hg
Precision	±10 mm Hg
<b>Air detector</b>	
Measurement procedure	Ultrasound transmission
Sensitivity	Lowering of the fluid level, air bubbles or microfoam
<b>Blood leak detector</b>	
Measurement procedure	optical
Sensitivity	≤ 0.5 mL/min blood loss HCT 32% at max. filtrate flow
<b>Syringe pump (anticoagulants)</b>	
Continuous flow	0.1–25 mL/h
Bolus	0.1–5 mL/Bolus
<b>External interfaces</b>	
Data interface multiDataLink (optional)	(LAN/Ethernet, 10 Base-T) for direct output of data to the network
Alarm output	potential-free alarm output
<b>Accessories</b>	
Plasma stand (optional)	M280041
Paediatric haemofilter holder	M384201

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