



Hemodialysis Equipment **DBB-EXA™**

Reducing costs

Assist easy operation

Kind to patients

Useful features

Concept

User-friendly and cost efficient dialysis monitor providing safe and adequate hemodialysis.

DBB-EXA has been developed for the value-oriented dialysis providers who are committed to high quality and safety standards, looking for a monitor to deliver standard HD treatments and advanced therapies as well.

DBB-EXA is a compact, user-friendly and cost efficient dialysis monitor providing a safe and adequate hemodialysis.

With a variety of configurations and options, DBB-EXA meets the needs of the modern dialysis facility.



Inherited reliability



DBB-EXA incorporates RAKU

Reducing costs

For the administrator who manages the dialysis facility, and is seeking a way to reduce the treatment cost, DBB-EXA is the dialysis machine that can reduce the total cost of ownership.

Kind to patients

For the dialysis patient, DBB-EXA is the dialysis machine that provides a comfortable treatment environment thanks to its smart, quiet and compact design.

Assist easy operation

For the healthcare professional who requires more time for the patient, DBB-EXA is the dialysis machine that can provide more time for patient care by reducing routine dialysis tasks.

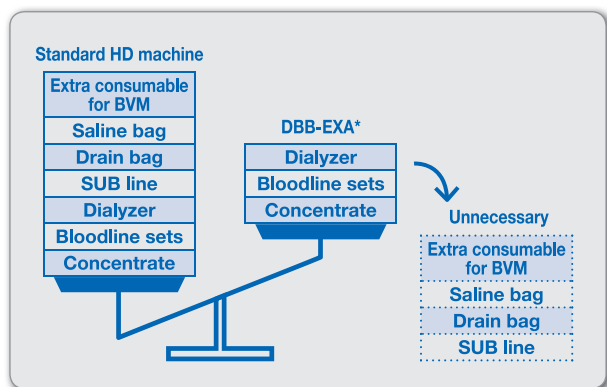
Useful features

For the nephrologist who wants to deliver a safe and effective treatment, DBB-EXA is the dialysis machine that provides accurate and safe monitoring as well as flexible treatment modes.

Reducing costs

Nowadays dialysis facilities face a reduction in reimbursement.

In order to reduce the treatment cost, DBB-EXA is designed to minimize the consumption of consumables. With inherited reliability and time-proven mechanical components of the DBB series, DBB-EXA can minimize maintenance costs with simple preventive maintenance and long MTBF.



* When using DBB-EXA with D-FAS and BVM option.

- Priming, wash back and emergency bolus can be performed with dialysis fluid to save on saline cost.
- Online priming, wash back and emergency bolus can be performed without substitution line or special adapter, eliminating extra cost.
- Online priming solution and substitution fluid is purified using the integrated reusable double stage endotoxin retentive filter cascade.
- Priming fluid from the extracorporeal circuit can be drained through the drain port to eliminate the need for a drain bag. The drain port can be utilized in priming for both dialysis fluid and saline.
- BVM can be measured with Nikkiso standard bloodline set. No need for extra consumable for BVM.
- Screen motion sensor enabling automatic switch-off of screen.

Assist easy operation

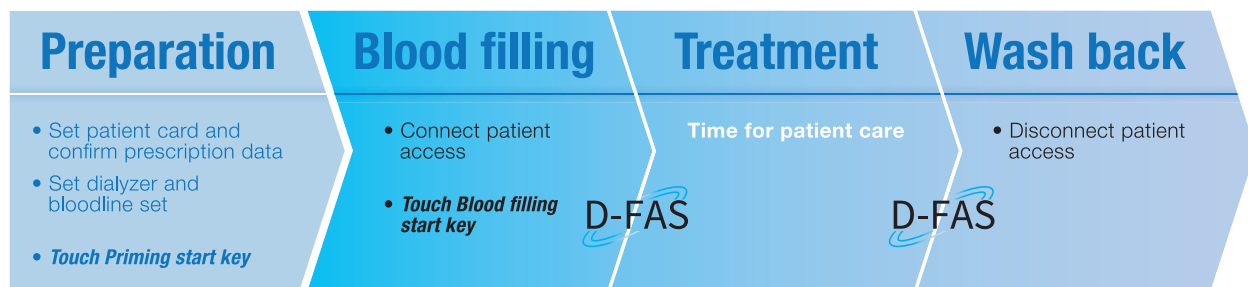
D-FAS

Dialysis Full Assist System

Healthcare professionals in the dialysis facility have many tasks to complete such as lining, priming, entering prescribed treatment data, blood filling and wash back besides the primary role of patient care.

Dialysis Full Assist System (D-FAS) can simplify user operations.

As a result, it may be possible that operator errors and / or the risk of contamination can be significantly reduced.



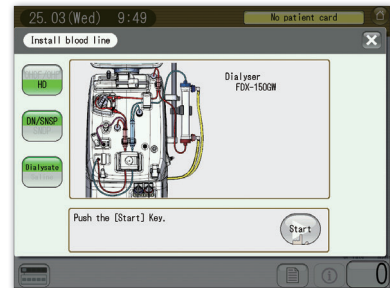
Advantages

- Reducing standard operational tasks between treatments such as preparation, connecting and disconnecting patients.
- Minimizing the number of times the operator has to interact with DBB-EXA.
- Simplifying the tasks to reduce operator errors and risks of contamination.
- Dialysis facility can select priming, wash back and emergency bolus utilizing dialysis fluid or saline (based on the facilities policy).
- Wash back solution can be switched from dialysis fluid to saline. The operator can keep the standard wash back procedure even if the power supply is interrupted.
- D-FAS blood filling removes the priming solution automatically through the dialyzer. Patient UF removal can be minimized.



D-FAS priming

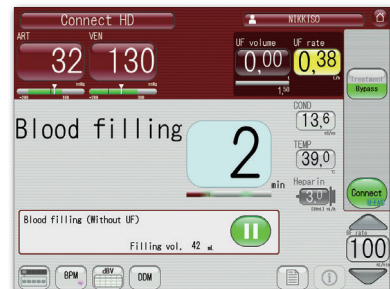
The operator installs the bloodline set and dialyzer, and then starts D-FAS priming. D-FAS automatically primes the extracorporeal circuit without operator intervention.



D-FAS blood filling

The operator simply connects the arterial and venous patient access and starts D-FAS blood filling.

D-FAS blood filling can remove the priming solution automatically through the dialyzer, therefore the patients UF removal can be minimized.



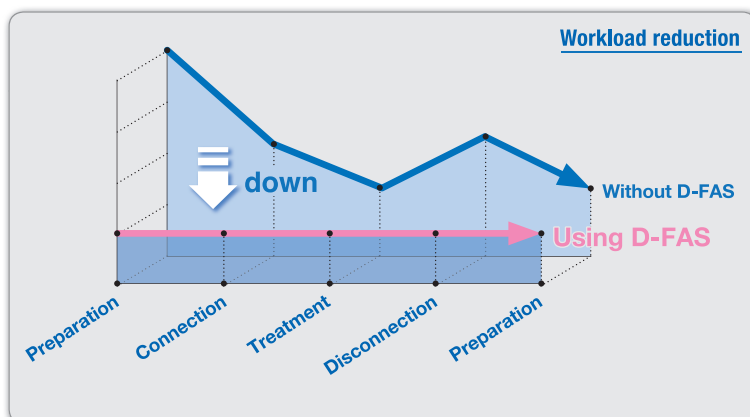
D-FAS wash back

After the completion of the treatment, D-FAS wash back returns the blood in the extracorporeal circuit automatically through the arterial and venous patient access without any operator intervention. All the operator needs to do is simply disconnect the patient.



D-FAS emergency bolus

The operator can start the emergency bolus without handling the bloodline set. D-FAS emergency bolus can deliver automatically a defined volume of substitution fluid to the patient.



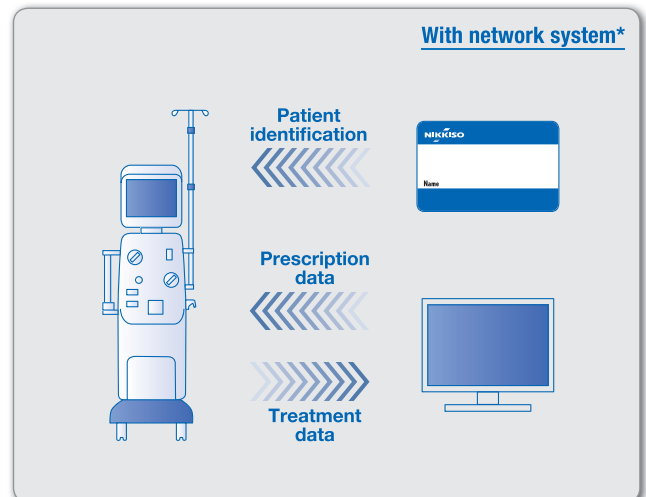
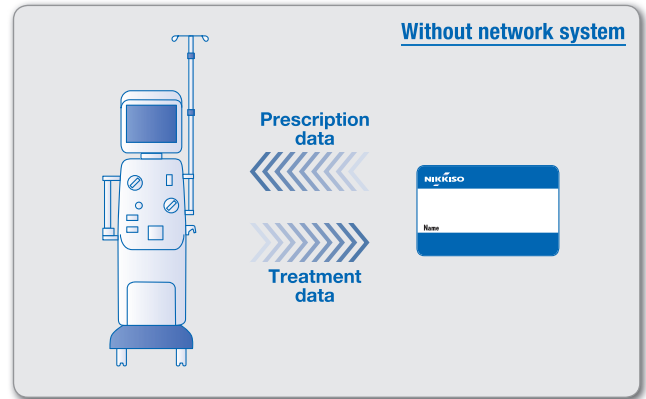
Assist easy operation

Patient card

Patient prescription and treatment data of the last 3 sessions can be stored on the patient card. The operator places the patient card on the machine before preparation and the prescription data is uploaded. Patient treatment data of the last 3 sessions can be recalled at any time. After treatment completion the treatment data is stored on the patient card automatically.

By utilizing the patient card, the dialysis facility can operate like an automated dialysis system without having the expense of a network being installed.

If the dialysis facility is equipped with a dialysis network system, the patient prescription can be downloaded, and treatment data can be uploaded between DBB-EXA and the dialysis network.*



* Under development

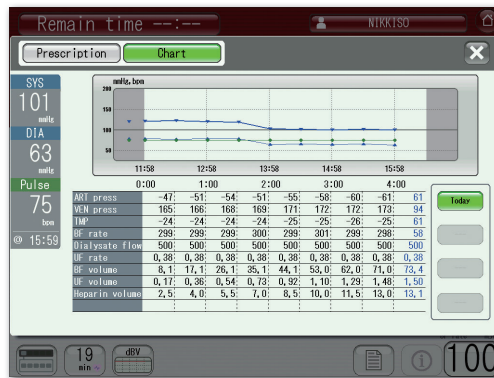


User-friendly interface

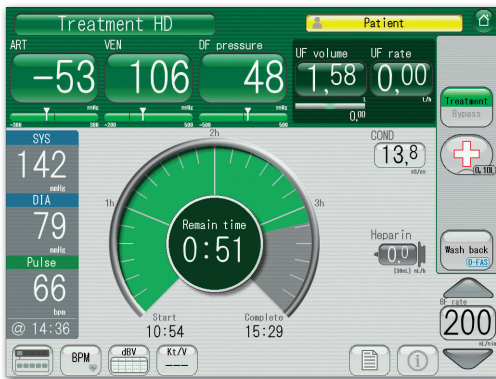
The user-friendly interface has operational guidance with intuitive graphical instructions. The interface is designed to simplify the operation. Using D-FAS and patient card, the number of screens and key strokes is minimized. Displayed information can be customized individually to fulfill all dialysis facilities requirements.



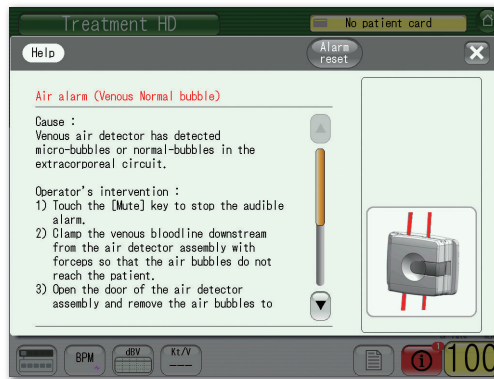
Informative screensaver, Improved legibility from a distance.



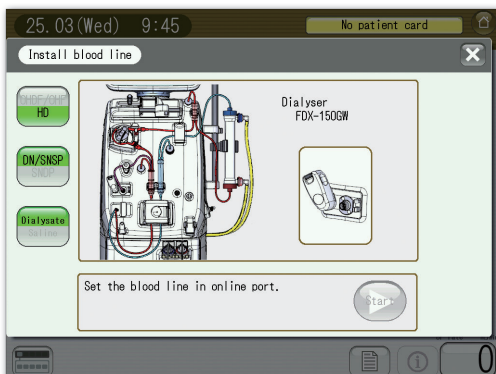
Treatment chart screen for easy documentation.



Basic screen during a treatment. Monitors and keys are customizable.



Help screen. Informative troubleshooting guidance, related monitor and keys appear.



Preparation screen. Intuitive guidance to set up bloodline set.



Prescription screen. Minimum information for simplified operation.

Kind to patients

Smart design

The patient is located in the immediate vicinity of the dialysis machine whilst on treatment. DBB-EXA provides a comfortable treatment environment for the patient through its smart and compact design.



- A curved appearance softens its mechanical impression and is easily integrated into a modern dialysis facility.
- External dimensions which are decreased in depth softens the appearance to the patients.
- Integrated BVM, online port and drain port gives the machine a neat appearance.
- Contactless patient card makes card reader surface smooth.



15 inch flat touch screen with wider viewing angle.
4 colored status display on the top of screen visible from any angle.



Smooth curved surfaces allowing for easy cleaning.



A well laid-out extracorporeal circuit minimizes patient extracorporeal blood volume and makes it easy to install the bloodline set.



Integrated document holder keeping patients area neat and tidy.



The blood pressure monitor cuff holder with detachable flap for ease of cleaning.



Simple and easy brake pedal, enabling locking of all 4 wheels.



Grip handle with integrated cable hook for ease of maneuverability.



Useful features

Monitoring patient blood pressure and blood volume

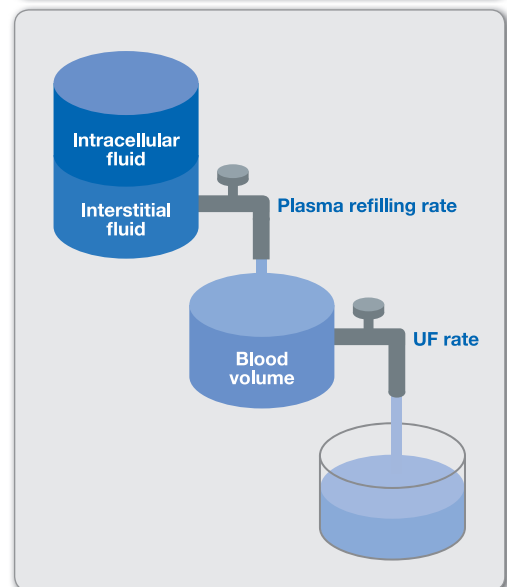
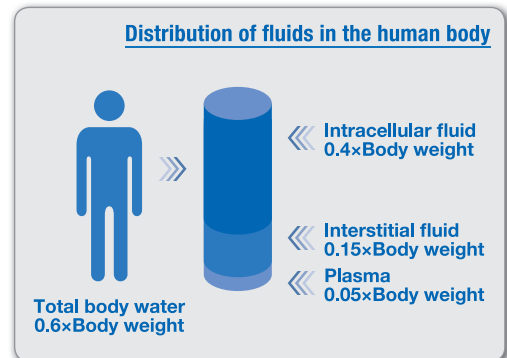
Common complications during hemodialysis are hypotension (20-30% of dialysis sessions), cramps (5-20%), nausea and vomiting (5-15%). Hypotension is relative to the plasma volume that is removed during an average dialysis session. Cramps, nausea and vomiting are considered as associated with hypotension [1]. Fluid management becomes a key clinical objective.

Body water distribution in the human body

Total body water is distributed between the intracellular fluid (ICF) compartment (2/3) and the extracellular fluid (ECF) compartment (1/3). The ECF compartment is further subdivided into interstitial fluid (3/4 of ECF) and plasma (1/4 of ECF) [2].

UF rate and Plasma refilling rate

UF rate during treatment is exclusively from blood plasma. Fluid volume reduction of blood initiates plasma refilling from other compartments to recover fluid volume. This refilling rate is called plasma refilling rate (PRR). If UF rate is equal or less than PRR, blood volume is kept the same or recovered. If UF rate is more than PRR, blood volume is reduced. Undesired reduction in blood volume results in a blood pressure drop [3].



BPM

Blood Pressure Monitor (BPM) with UF reduction DBB-EXA can measure the blood pressure with the integrated BPM. Measurement timing can be selected from manual, auto measurement or continuous. Results are displayed in graphical form and the UF rate can be reduced automatically when it reaches a preset limit.

Advantages of BPM and Haemo-Master

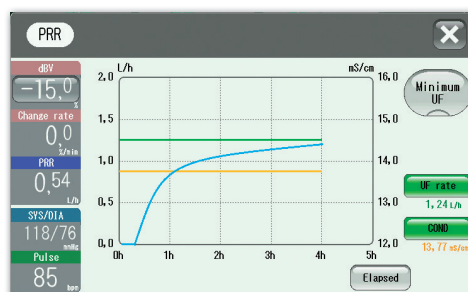
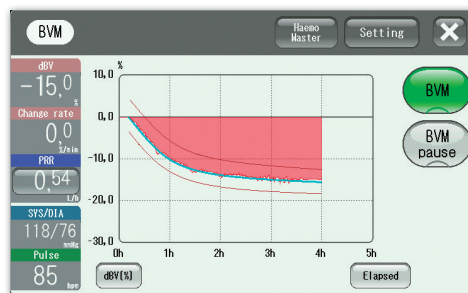
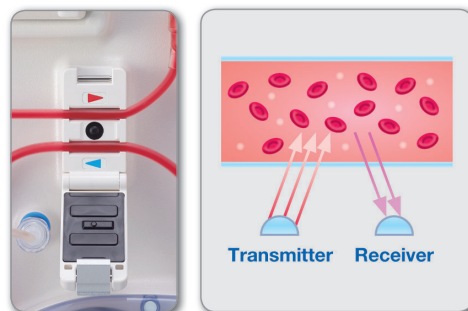
- Integrated, easy to handle
- No additional costs for disposables
- BPM with automatic UF reduction
- Continuous Blood Volume Monitoring
- Automatic regulation of the UF rate and dialysis fluid conductivity

Haemo-Master

Blood Volume Monitor (BVM) and Plasma Refilling Rate (PRR)

BVM module transmits near-infrared light through the bloodline and measures the reflected light. A wavelength of near-infrared light is adsorbed and reflected by the red blood cells.

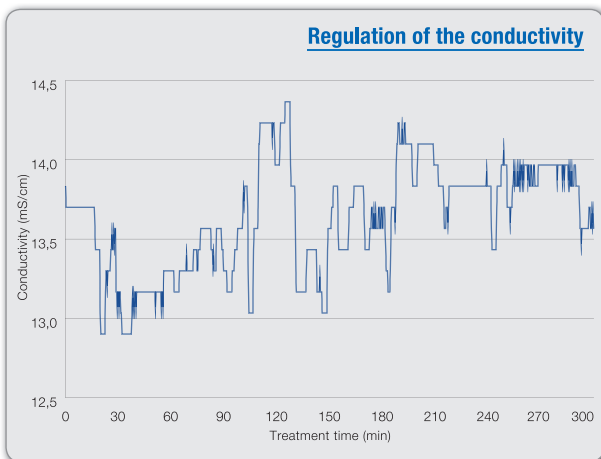
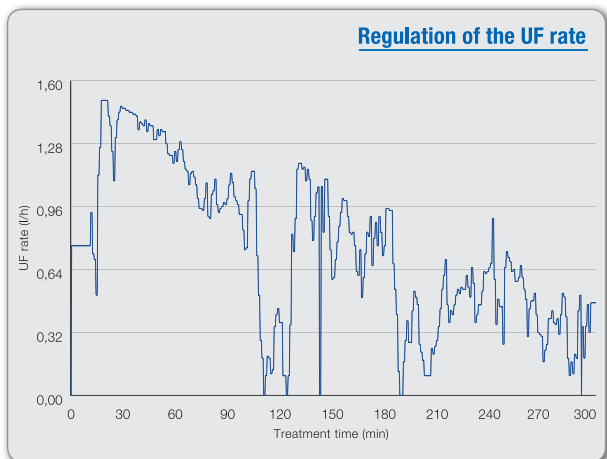
Patient blood volume and blood cell concentration in the arterial bloodline are correlated. Haemo-Master observes the change of reflected light during the treatment and a change of patient blood volume (dBV) can be monitored continuously. Blood volume measurement is considered as a useful tool to help improve tolerance and the hemodynamic response [3]. Estimated patient PRR is calculated from UF rate and dBV trend. Nephrologists can refer to the PRR to help estimate adequate UF rate to stabilize the dBV. The monitored dBV and PRR are displayed in graphical form and clinicians can observe the patient fluid status visually.



BV-UFC and BV-COC

For each patient an individual curve for the ideal blood volume change is established.

DBB-EXA continuously measures dBV during the dialysis treatment. This is the basis for automatic regulation of the UF rate (BV-UFC) and dialysis fluid conductivity (BV-COC) so that patient dBV follows the ideal curve. Some studies show that automatic regulation of the UF rate and dialysis fluid conductivity reduces incidents of hypotensive episodes and the frequency of symptoms during the treatment [4-6].



Useful features

DDM

Dialysis Dose Monitor

Positive long-term prognosis & higher quality of life for your patients!

Several studies have proven that a positive long-term prognosis and improved quality of life (QOL) of patients depends on the actual delivery of dialysis dose. Adequate dialysis dose may improve QOL [7-9].

Insufficient clearance performance can have various reasons:

- No counter flow of blood and dialysis fluid due to incorrect connection
- Shunt recirculation
- Dialyzer clotting
- Frequent alarms of dialysis machine which shortens effective treatment time
- Reduced effective blood flow etc.

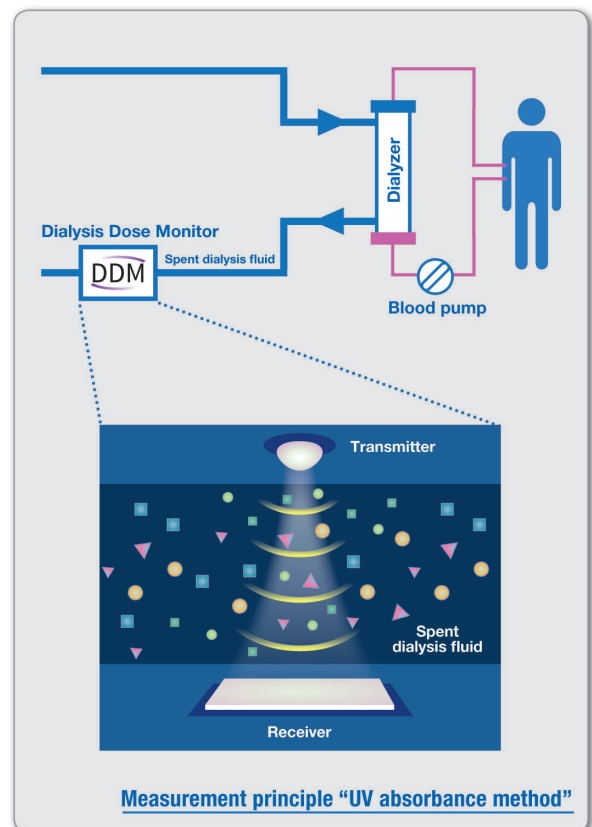
Measurement principle of the DDM

A sensor located directly in the spent dialysis fluid measures the absorbance at a wavelength which directly correlates with patient blood urea nitrogen (BUN) concentration.

The continuously measured values are inserted in the formulas for single pool Kt/V (spKt/V) and urea reduction ratio (URR) and the results are immediately displayed.

Advantages of the Dialysis Dose Monitor

- Real-time monitoring
- Recognize treatment inconsistencies
- Easy handling
- No additional costs for disposables

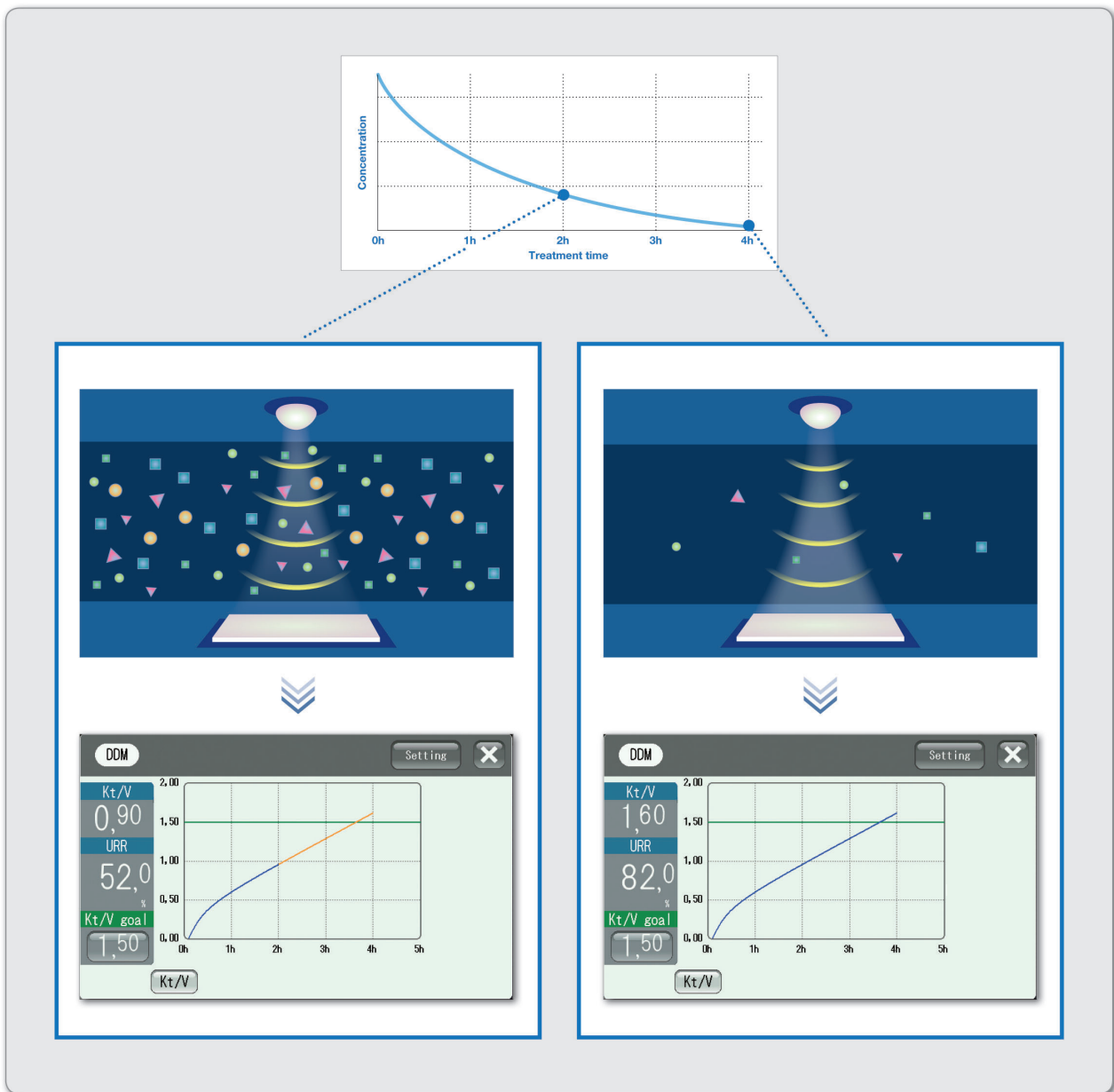


Reaching treatment goals

Reaching the individual treatment goals for your patients can only be achieved by always knowing the actual status. At the same time, necessary adaption of treatment parameters must be considered.

By using the Dialysis Dose Monitor, measured Kt/V is displayed in graphic form with a projection line.

You can see deviations from the treatment goal at an early stage, and react accordingly.



Online HDF

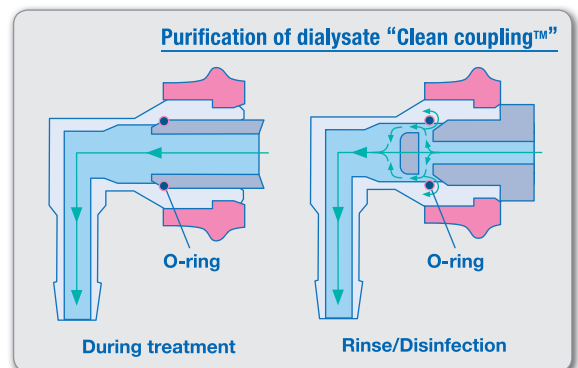
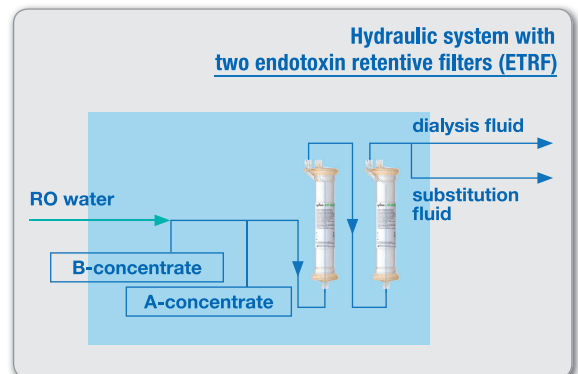
Hemodiafiltration (HDF) has an improved clearance of low molecular weight protein compared with hemodialysis (HD), and is considered as a treatment mode with higher dialysis efficiency.

Recently several prospective studies which compare HDF with HD have been conducted in large scale [10-13]. The ESHOL study reported that post dilution online HDF with high convection volume reduces all-cause mortality [14].

DBB-EXA is a flexible dialysis machine which can perform different treatment methods such as post or pre-dilution HDF, HF, HD and isolated UF.

DBB-EXA can optimize substitution rate based on the set ratio with blood flow rate. Also substitution rate can be controlled automatically within set TMP limits to help prevent high blood concentration and TMP alarms.

Dialysis fluid and substitution fluid is purified using the integrated reusable double stage endotoxin retentive filter cascade. Dialyzer Clean couplings and online port are designed so that all dialysis fluid contact areas are disinfected to help prevent contamination.



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Specifications*

General data

Dimensions	1610 x 430 x 460 mm (H x W x D) Basement: 510 x 740 mm (W x D)
Weight	Approx. 90 kg (incl. all options)
Water supply	Pressure: 1 to 7 bar at minimum 800 mL/min at maximum 3000 mL/min Temp.: 5 to 30 °C
Drain	Minimum drain capacity: 800 mL/min average Height: 50 cm Temp.: 90 °C maximum
Concentrate supply	Pressure: 0 to 0.5 bar 2 central acid concentrates
Power supply	220 to 240 VAC ±10%, 50 to 60 Hz ±1 Hz
Battery	Ni-MH battery 24 V/3200 mAh
External connection port	External output (Staff call) External input 1 External input 2 Nurse call switch Network Serial interface (RS-232) BPM start switch USB2.0 or 3.0 CF card type I
Monitor	15 inch LCD

Extracorporeal circuit

Arterial pressure monitoring	Measurement range: -300 to +500 mmHg Measurement accuracy: ±10 mmHg
Venous pressure monitoring	Measurement range: -300 to +500 mmHg Measurement accuracy: ±10 mmHg
Dialyzer inlet blood pressure monitoring	Measurement range: -300 to +735 mmHg Measurement accuracy: ±10 mmHg
Single needle pressure	Measurement range : -200 to +600 mmHg Measurement accuracy : ±10 mmHg
Air detector	Method: Ultrasonic waves Sensitivity: 0.02 mL (Normal air bubbles) (At Blood flow rate: 250 mL/min) 0.0003 mL (microbubbles: blood/air mixture) (At Blood flow rate: 250 mL/min)
Arterial blood pump (PUMP1)	Setting range: 40 to 600 mL/min Flow rate accuracy: Set value ±10 % (inlet Pressure -150 mmHg ≤ P ≤ +150 mmHg) Set value -20 to 0 % (inlet Pressure -200 mmHg ≤ P < -150 mmHg)
Heparin pump	Setting range: 0.0 to 9.9 mL/h Output rate accuracy: Set value ±10 % Syringe type: 30 mL or 20 mL , 20 mL or 10 mL Bolus volume: 0.0 to 9.9 mL
Venous blood pump / Substitution fluid pump (PUMP2)	Setting range: 40 to 600 mL/min Flow rate accuracy: Set value ±10 % (inlet Pressure -150 mmHg ≤ P ≤ +150 mmHg) Set value -20 to 0 % (inlet Pressure -200 mmHg ≤ P < -150 mmHg)
Blood Pressure Monitor (BPM)	Pressure display range : 10 to 300 mmHg Pressure display accuracy : Less than ±3 mmHg Measurement range: Adult Systolic blood pressure (SYS) 60 to 250 mmHg Mean arterial pressure (MAP) 45 to 235 mmHg Diastolic blood pressure (DIA) 40 to 200 mmHg Pulse rate 40 to 200 BPM
Blood Volume Monitor (BVM)	Measurement principle : Near-infrared reflection method Applicable blood flow rate range : 40 to 600 mL/min Applicable hematocrit range : 15 to 50 % Accuracy : ±2.3 dBV% (Double needle)

* Please refer to the separate DBB-EXA Type and Options list

Hydraulic circuit

Dialysis fluid flow rate	Setting range: Single ETRF 300 to 800 mL/min Double ETRF 300 to 700 mL/min
Dialysis fluid temperature	Setting range: 34.0 to 40.0 °C
Dialysis fluid conductivity	Bicarbonate dialysis Bicarbonate conductivity setting range: 2.3 to 7.0 mS/cm Accuracy: ±0.1 mS/cm Total conductivity setting range: 12.7 to 15.2 mS/cm Accuracy: ±0.2 mS/cm Acetate dialysis Total conductivity setting range: 12.7 to 15.2 mS/cm Accuracy: ±0.2 mS/cm
Blood leak detector	Method: Optical Sensitivity: 0.3 mL Blood / 1 L Dialysis fluid (Blood: Hematocrit 32 ± 2 %; Dialysis fluid temperature: 37 °C)
Ultrafiltration	UF rate: 0.00; 0.10 to 4.00 L/h UF accuracy (Balance): ±30 mL/h (At dialysis fluid flow rate 300 to 500 mL/min) ±0.1 % of the dialysis fluid flow rate (At dialysis fluid flow rate 501 to 800 mL/min)
Dialysis Dose Monitor	Measurement principle: Absorptometry Applicable Treatment mode: HD, On-line HDF Applicable Kt/V range: 0 to 3.0 Kt/V monitoring accuracy: ±0.1 (Kt/V 0 to 1) ±10 % (Kt/V 1 to 3) Applicable URR range: 0 % to 100 % URR monitoring accuracy: ±5 %
Endotoxin retentive filter	EF-02

Treatment options

Online HDF/HF	Substitution flow setting range : 0.00; 0.10 to 18.00 L/h (Online HDF) 0.00; 0.10 to 30.00 L/h (Online HF) Flow rate accuracy : ±10 % of set value
Single needle treatment	Single needle single pump treatment Single needle double pump treatment SN control pressure: : Upper limit: +200 mmHg Lower limit: +50 mmHg
UF profile	10 programmable profiles available
Conductivity profile	10 programmable profiles available

Cleaning program

Disinfection and decalcification	50 % Citric acid DIALOX (Peracetic acid)
Disinfection and degreasing	Sodium hypochlorite solution (Maximum 10 %)
Decalcification	30 % Acetic acid

Accessories

Hook for Concentrate bags	Max. load 10 kg
Patient card	MIFARE Classic 4K Capacity: 4096 byte
Nurse call switch	

Manufacturer

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