

Specifications

General data

Dimensions	H150 cm x W43 cm x D50 cm Base: W45 cm x D61 cm
Weight	Approx. 80 kg (incl. all options)
Water supply	Pressure: 1 to 7 bar
Drain	Minimum drain capacity: 800 mL/min average Height: 50 cm maximum Temp.: 90 °C maximum
Concentrate supply	Pressure: 0 to 0.5 bar
Power supply	220 to 240 VAC, 50/60 Hz 110 to 120 VAC, 50/60 Hz
Battery	Ni-MH battery 24 V / 3200 mAh
External connection port	External output (Staff call) External input 1, External input 2 Network BPM start switch USB 2.0 or 3.0
Screen	15 inch LCD

Hydraulic circuit

Dialysis fluid flow rate	Setting range: 300 to 800 mL/min
Dialysis fluid temperature	Setting range: 33.0 to 40.0 °C
Dialysis fluid conductivity	Bicarbonate dialysis Bicarbonate conductivity setting range: 2.3 to 7.0 mS/cm Total conductivity setting range: 12.7 to 15.2 mS/cm Acetate dialysis Total conductivity setting range: 12.7 to 15.2 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: ±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 *optional	Measurement principle: Absorptiometry Applicable Treatment mode: HD Applicable Kt/V range: 0 to 3.0 Applicable Kt range: 0 to 300.0 Applicable K range: 0 to 999.9 Kt/V monitoring accuracy: ±0.1 (Kt/V 0 to 1) ±10 % (Kt/V 1 to 3) eKt/V: 0 to 30 Applicable URR range: 0 % to 100 % URR monitoring accuracy: ±5 %
Endotoxin retentive filter (ETRF)	Filter for dialysate purification EF-02 series

Treatment options

Single needle treatment	Single needle single 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

- This brochure is for DBB-EXA ES general. But it describes only functions available with "type B."
- The appearance and specifications are subject to change without prior notice.
- The photograph of the exterior view may appear different due to printing quality.
- Read the accompanying operation manual before use.

Manufacturer
NIKKISO CO., LTD.

20-3, Ebisu 4-Chome, Shibuya-ku,
Tokyo 150-6022, Japan

Telephone +81-3-3443-3727
Fax +81-3-3440-0681

Website www.nikkiso.com

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
Single needle pressure	Measurement range: -200 to +600 mmHg Measurement accuracy: ±10 mmHg
Air detector	Method: ultrasonicwaves 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	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)
Effective blood flow	Measurement range: 0 to 999mL/min Measurement accuracy: + -10%
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
Blood Pressure Monitor (BPM) *optional	For standard 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 beats per minute For iNIBP: Pressure display range: 0 to 300 mmHg Pressure display accuracy: Less than ±3 mmHg Measurement range: Adult systolic blood pressure (SYS) : 40 to 280 mmHg Mean arterial pressure (MAP) : 10 to 280 mmHg Diastolic blood pressure (DIA) : 10 to 235 mmHg Pulse rate: 30 to 200 beats per minute

Cleaning program

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

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Hemodialysis equipment DBB-EXA ES



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+91 98400 80008
corporate@trivitron.com | www.trivitron.com



Enhancing treatment quality through simple operation and various monitoring functions

DBB-EXA ES is hemodialysis equipment dedicated to hemodialysis (HD). Simple operation and various monitoring features are achieved by integrating Nikkiso's original expertise, which leads to enhanced treatment quality. Our aim is to provide enhanced treatment quality to more patients with the essential treatment modality, hemodialysis.

DBB-EXA ES, with a smart design and intuitive, user-friendly interface, smoothly fits all dialysis facilities.

The intuitive, user-friendly interface on a rotatable monitor with a large touch screen has operational guidance with graphical instructions to simplify the operation. The dialysis facilities can customize displayed information individually to fulfill each dialysis facilities' requirements.



DBB-EXA ES



A slide type front panel for easy maintenance access



Basic screen during treatment
Monitor and keys are customizable.



Prescription screen to reduce the touches for data entry
Operators can prescribe dialysis fluid concentration with Na⁺ and HCO₃⁻ in mmol.



Screen saver with improved legibility from a distance.



Chart screen to provide a quick overview of treatment data.

The smart design for easy daily maintenance and a small footprint will appeal to users.



Smooth curved surfaces that allow for easy cleaning



The rear handle and large wheels for easy movability



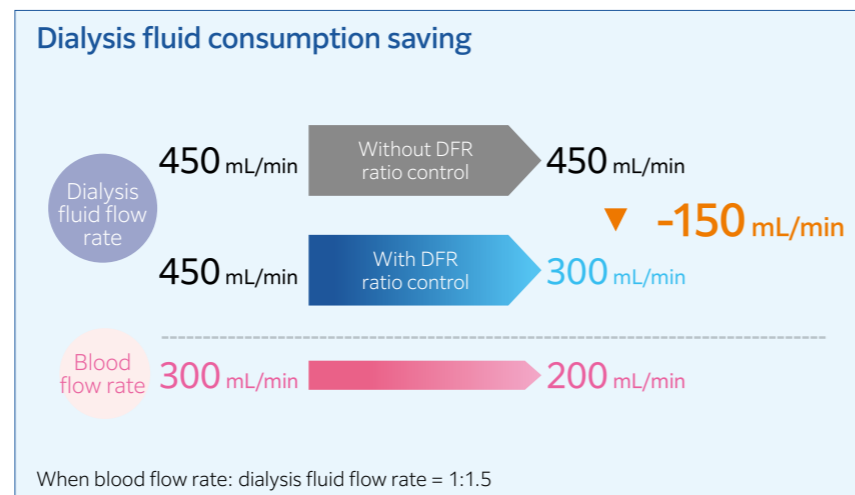
Interface hub for connecting networks and various alarm in- and outputs. Unique Publicity Available Specification connection port for external alarm devices is available. (IEC PAS 63023:2016)

DBB-EXA ES helps running cost savings

DBB-EXA ES has various functions which help running cost savings.

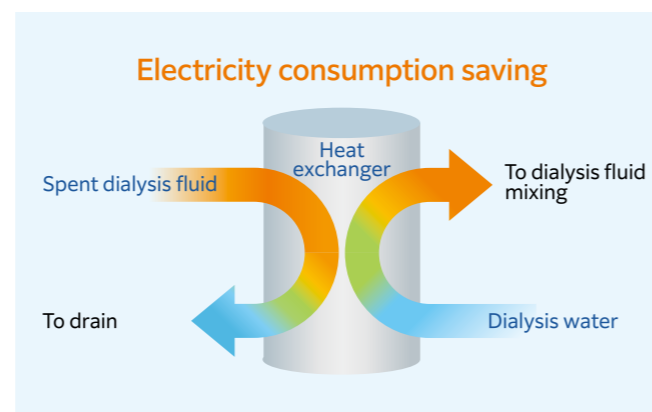
Dialysis fluid consumption

If the blood flow rate is changed, the dialysis fluid flow rate is automatically reconfigured according to a predetermined ratio when dialysis fluid flow rate (DFR) ratio control is used. The DFR setting is available in increments of 1 mL, so that dialysis fluid can be saved and the required dialysis dose can be secured.



Electricity consumption

DBB-EXA ES electricity consumption can be saved by exchanging heat between the spent dialysis fluid and dialysis water via a heat exchanger. According to our research performed with DCS-100NX, electricity consumption can be saved by approximately 25 % per treatment by using a heat exchanger.



Inherited design philosophy of Nikkiso hemodialysis equipment

- DBB-EXA ES is equipped with a UF removal system which is backed by a long history.
- DBB-EXA ES provides accurate bicarbonate concentrate monitoring by mixing and monitoring bicarbonate before acid. It is possible to set appropriate bicarbonate concentrate for each patient's condition.
- DBB-EXA ES provides continuous monitoring of the fluid removal system without reducing dialysis time. Fluid leak may be identified and caught before they cause harm.
- DBB-EXA ES with slide type front panel can be opened with 2 screws, side panels with 1 screw each. The real time function of each hydraulic actuator can be checked by touching the symbol on the flow diagram screen in service mode. DBB-EXA ES is designed so that each actuator can be accessed and checked easily for maintenance and troubleshooting.
- DBB-EXA ES automatically switches to emergency battery operation if a power failure occurs during treatment.

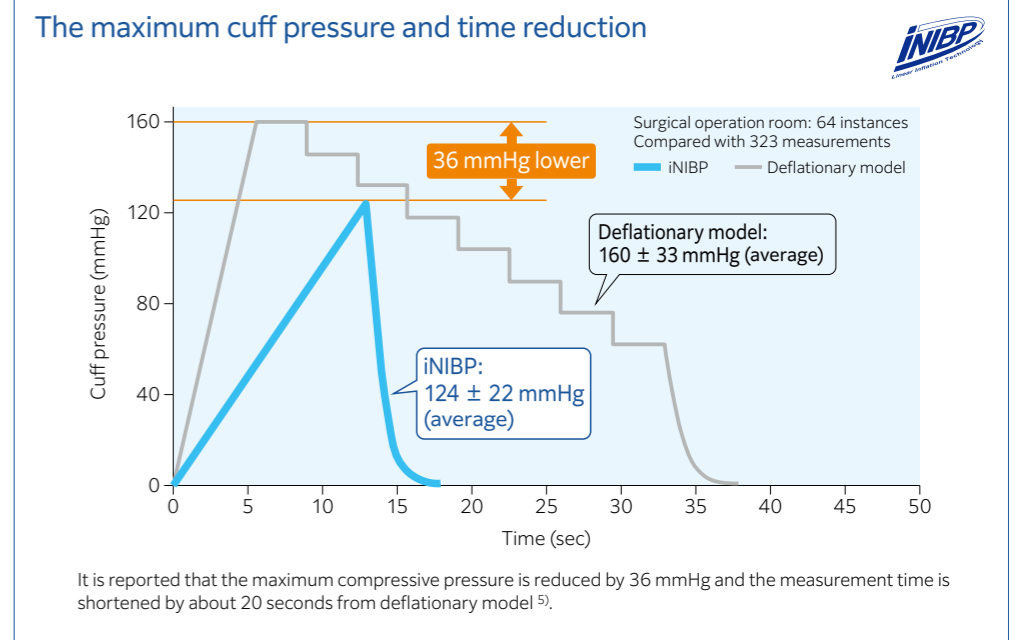
Inflationary NIBP helps reducing patient stress due to routine blood pressure measurements



Less cuff pressure, Less measurement time

DBB-EXA ES is compatible with inflationary non-invasive blood pressure (iNIBP) monitor.

The iNIBP gradually increases cuff pressure compare to conventional deflationary model, detects pulse wave during inflation, and releases the cuff pressure immediately after systolic pressure is detected. It is reported that iNIBP lower maximum cuff inflation pressure and shorter duration time in comparison to a deflationary model*. Our aim is to minimize the patient stress arising from frequent blood pressure measurements.



Other features

- Manual, automatic or continuous measurement can be selected.
- Obtained measurements can be displayed on a chart.
- When the systolic blood pressure declines and reaches alarm level, the blood flow and ultrafiltration rate changes automatically to acceptable levels predetermined for each patient.



The cuff holder of the Blood Pressure Monitor

[References]

*Onodera, J; Kotake, Y; Fukuda, M. et al. Validation of inflationary non-invasive blood pressure monitoring in adult surgical patients. J Anesth. 2011, 25(1), 127-130.

Enhancing QOL through secured adequate dialysis dose

Findings yielded by multiple studies indicate that the dialysis dose is related to the patient's prognosis^{1,2)}. To enhance the quality of dialysis treatment, it is therefore important to confirm that the dialysis dose is sufficient. DBB-EXA ES measures the dialysis dose in real time using the Dialysis Dose Monitor (DDM) without interfering with the dialysis treatment.

helps securing dialysis dose

DBB-EXA ES can be combined with a Dialysis Dose Monitor (DDM) to measure standardized dialysis dose (Kt/V) in real time while continuing dialysis treatment without calibration which interferes with treatment time. Our aim is to provide useful data for improving treatment quality.



A chart demonstrating Kt/V measured in real time.

- Change in the spent dialysis fluid absorbance at specific wavelengths in the UV-light range are known to be correlated with changes in blood urea nitrogen (BUN)³⁾. The dialysis Dose Monitor (DDM) obtain Kt/V by using Daugirdas formula with UV absorbance change (UV absorbance method).
- DDM use UV absorbance method not sodium dialysance method. Therefore, it is continuous, real time measurement. Dialysis treatment is not interfered.
- DDM uses UV-LEDs which are the original Nikkiso DUV-LEDs.

[References]

- 1) Depner, T.; Daugirdas, J.; Greene, T. et al. Dialysis dose and the effect of gender and body size on outcome in the HEMO study. *Kidney Int.* 2004, 65, 1386-1394.
- 2) Greene, T.; Daugirdas, J.; Depner, T. et al. Association of achieved dialysis dose with mortality in the hemodialysis study: An example of "Dose-Target Bias". *JASN.* 2005, 16, 3371-3380.
- 3) Uhlin, F.; Fridolin, I.; Magnusson, M. et al. Dialysis dose (Kt/V) and clearance variation sensitivity using measurement of ultraviolet-absorbance (on-line), blood urea, dialysate urea and ionic dialysance. *NDT* 2006, 21, 2225-2231.

Bicarbonate cartridge holder

DBB-EXA ES can use a bicarbonate liquid-type or powder cartridge. The Bicarbonate cartridge is unsealed immediately before being installed in the device. It can then be used continuously while preparing B concentrate. Doing so reduces the risk of contamination, thereby keeping the dialysis fluid clean.



Bicarbonate cartridge as installed

Clean coupling™

Dialyzer coupling is considered a common contaminant point since it is difficult to disinfect its O-ring and the bypass coupler. Nikkiso Clean coupling achieved disinfection of O-ring with its unique design. And it eliminates the bypass coupler.



Clean coupling cross-section

Hot rinse

DBB-EXA ES can be programmed to feed hot water into its water supply line (branch) from the water supply (main loop), thereby passing it through the line while the RO system is being disinfected. This purifies not only the device interior but also the water supply line (branch).



Structures and functions for dialysis fluid and dialysis water purification

In addition to purify dialysis fluid with an endotoxin retentive filter, various other measures to prevent contamination are employed.

Endotoxin retentive filter

The endotoxin retentive filter purifies dialysis fluid to an acceptable level for priming. The filter is of the cartridge type and DBB-EXA ES is designed to drain residual solution automatically. This not only makes it easy to replace the filter but also reduces the weight at the time of disposal.



Endotoxin retentive filter



Tray



Concentrate container holder



Water leak detector

Other optional features. Please contact your sales representative about available options and functions that will best suit your needs.