AK 98 Machine Introduction Training Material

AK 98 Dialysis Machine

Introduction Module

Reference: AK 98 Operator's Manual 3.xx
Chapters 2 & 3

Baxter

INTENDED USE | Refer to Operator's Manuals SW 3.xx

Special Considerations:

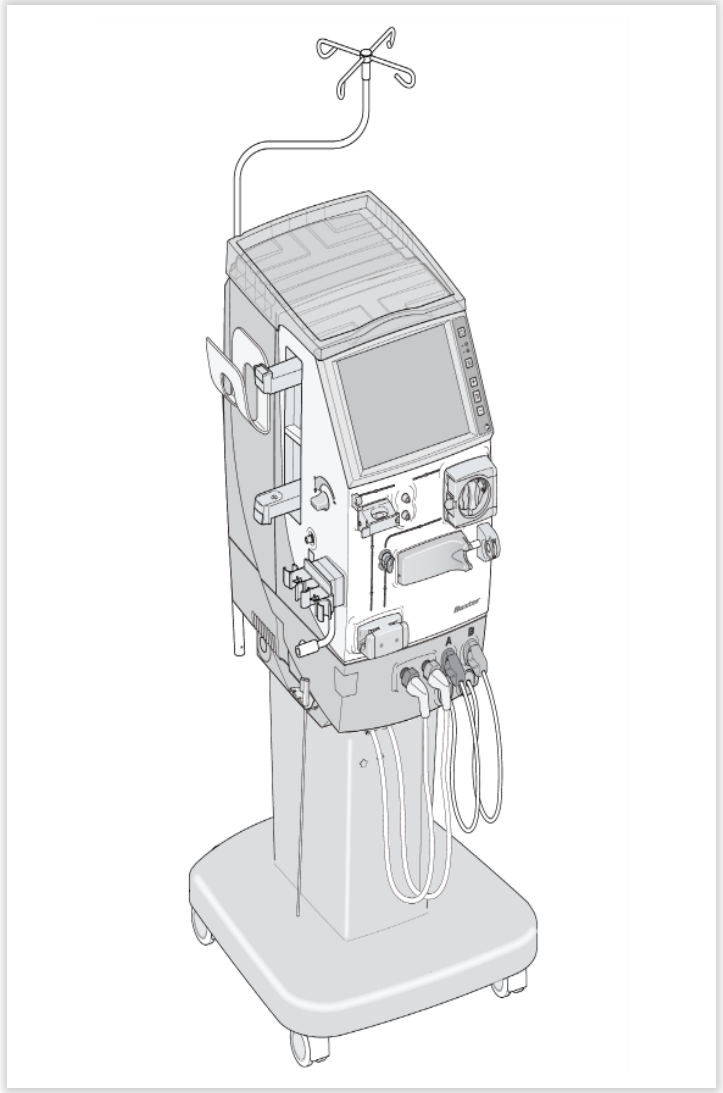
CAUTION!

If treating patients weighing below 25 kg it is recommended that UF supervision alarm limits are configured accordingly by an authorized service technician.

CAUTION!

The treatment of patients with a weight below 25 kg shall be performed under the full supervision of the physician. In these cases, additional measures to supervise the patient weight loss as per standard of care for low body weight is recommended. Failure to do so could result in serious adverse consequences like hypovolemia and hypotension.

AK 98 DIALYSIS MACHINE



Important Notice:

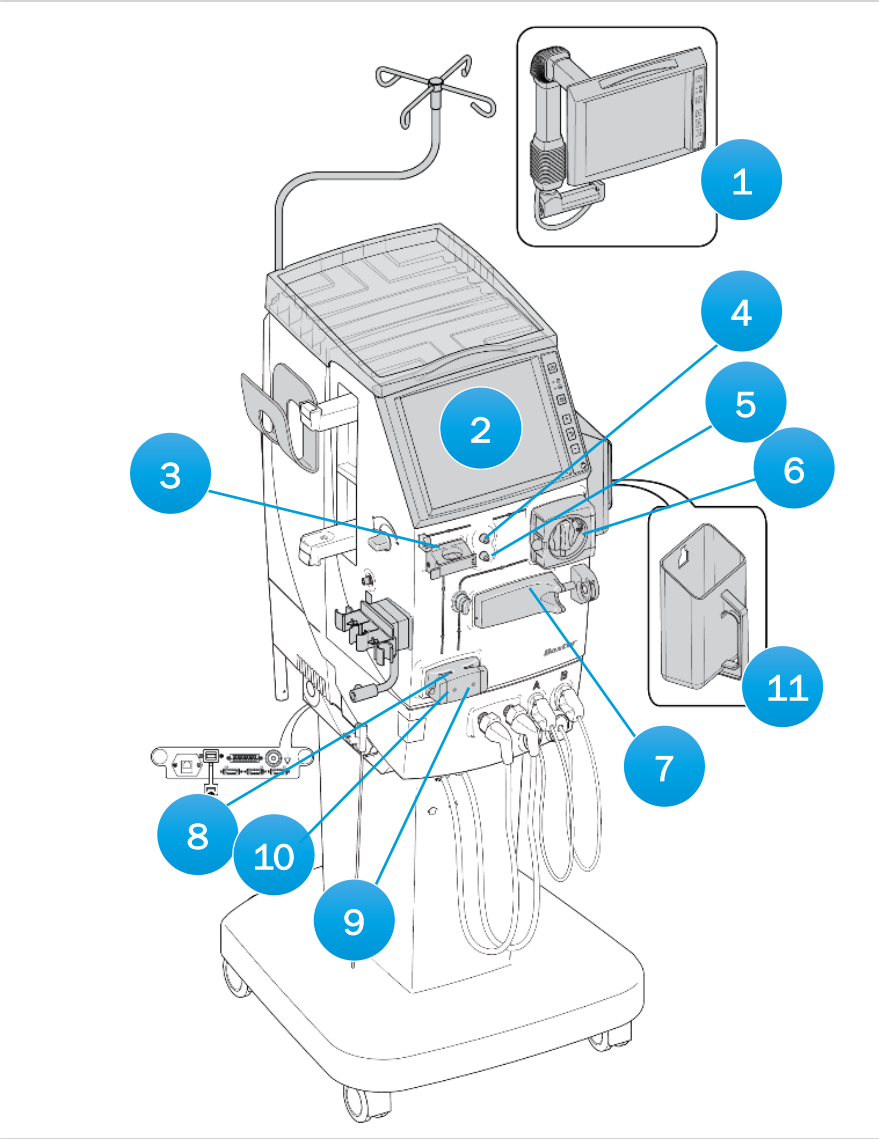
The contents of this training does not replace the training by the local healthcare provider. It does not replace the users responsibility to read and understand the full text of the Operator's manual prior to operating the machine. If there are deviations between the actions described here, and the instructions contained in the Operator's Manual, then the information from the Operator's Manual takes precedence.

LEARNING OBJECTIVES

The aim of this module is to obtain an overview of the **AK 98** dialysis machine with special focus on:

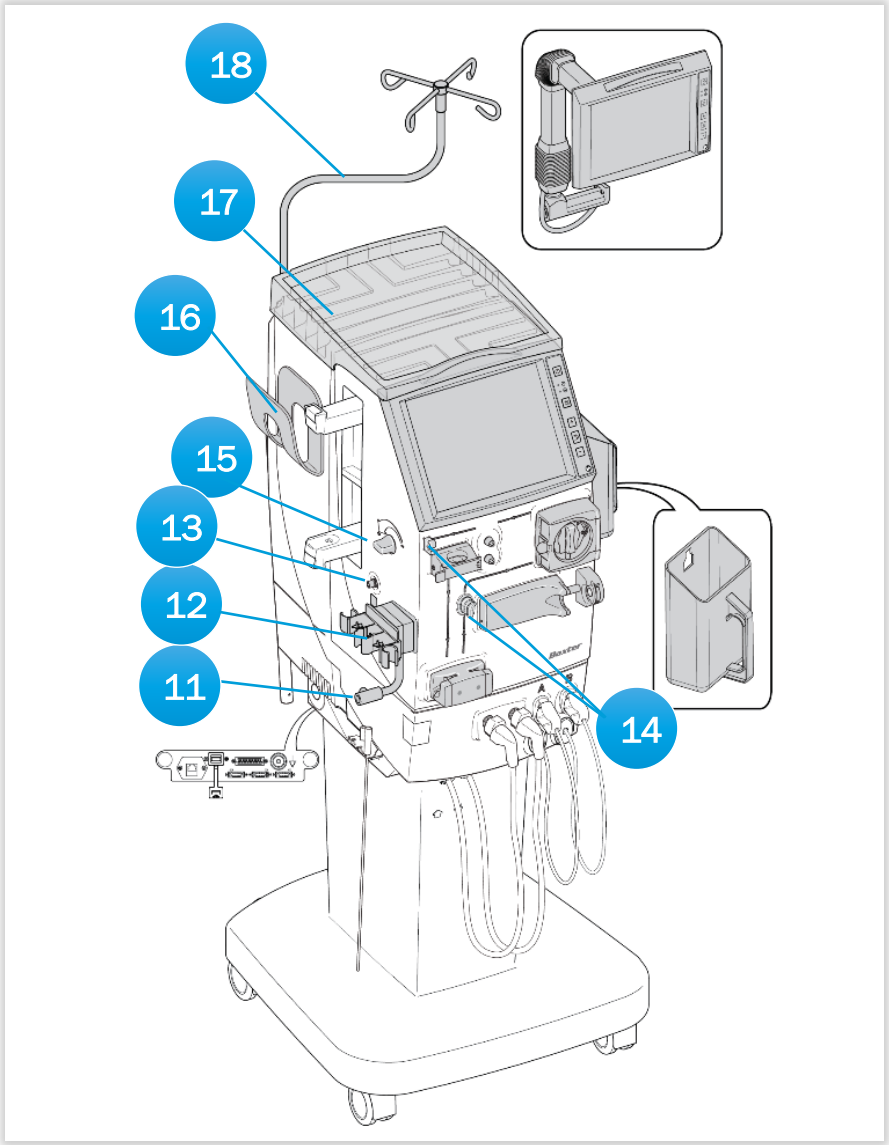
- The blood part of the machine
- The fluid part of the machine
- The operator's panel
- Setting of the treatment parameters and activating functions

MACHINE EXTERNAL COMPONENTS | Blood Part



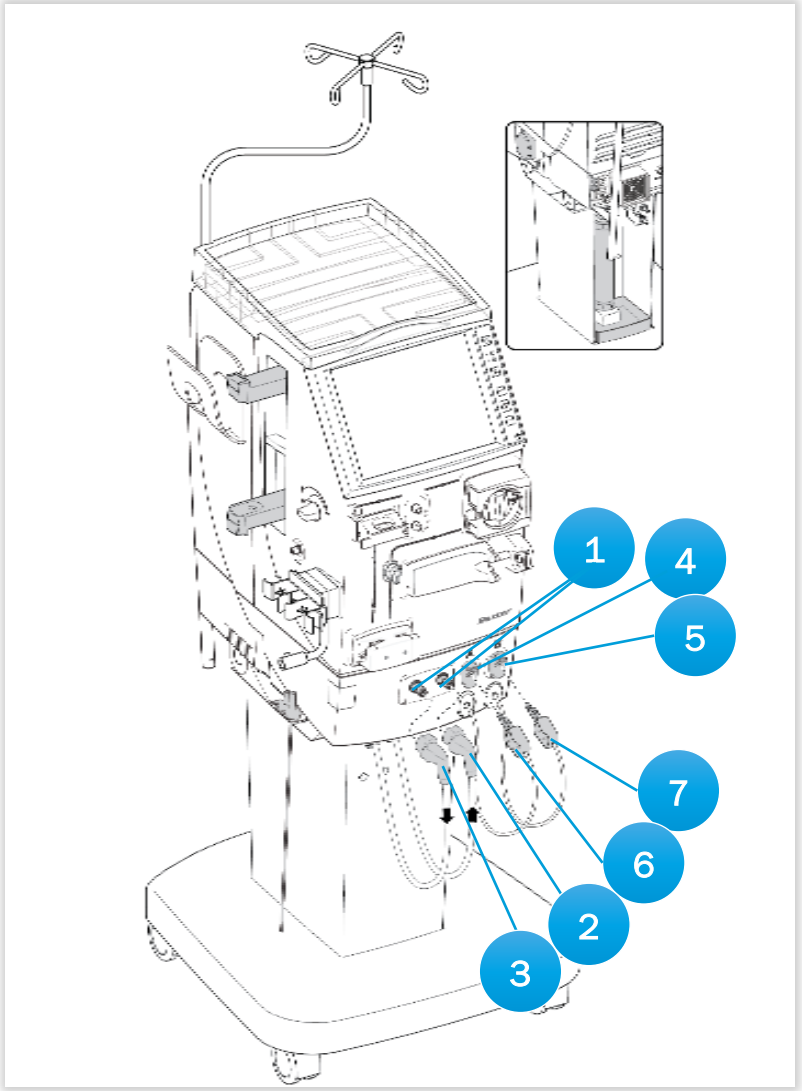
1. Remote Operator's panel (not available in all markets)
2. Operator's panel
3. Air detector
4. Venous pressure transducer connector
5. Arterial pressure transducer connector
6. Blood pump
7. Heparin pump
8. Priming detector
9. Arterial blood line clamp
10. Venous blood line clamp
11. Prime bucket (not available in all markets)

MACHINE EXTERNAL COMPONENTS | Blood Part



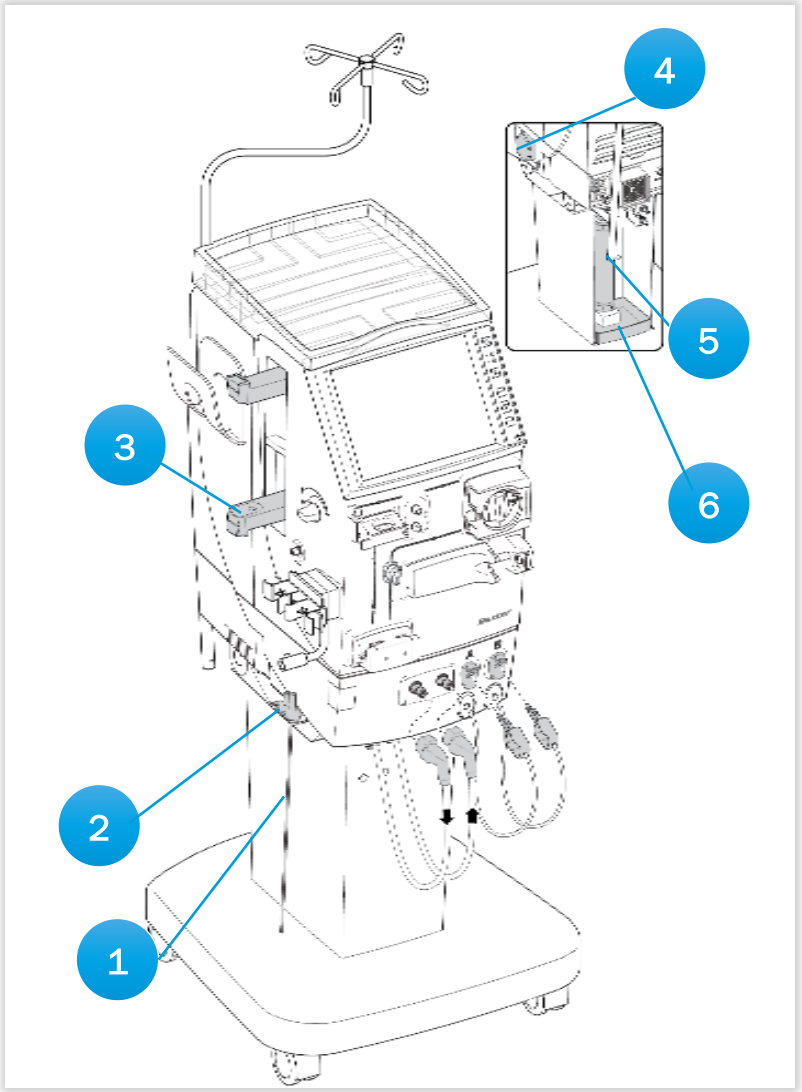
11. Arm for dialyzer holder
12. Expansion chamber holder
13. Blood pressure monitor (BPM)
14. Blood line guides
15. Level adjustment knob
16. BPM cuff holder
17. Top tray
18. Infusion stand

MACHINE EXTERNAL COMPONENTS | Fluid Part



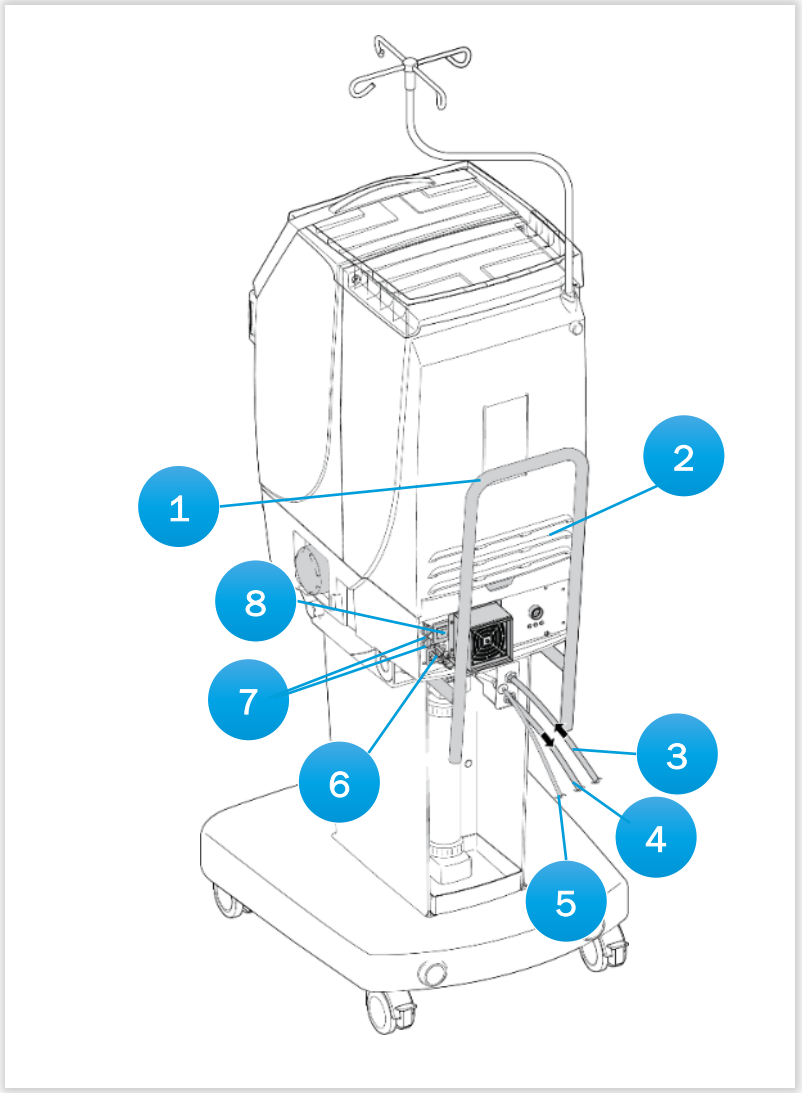
1. Stand-by ports for dialysis fluid tubes
2. Dialysis fluid tube from machine to dialyzer (blue)
3. Dialysis fluid tube from dialyzer to machine (red)
4. Stand-by port for red concentrate connector
5. Stand-by port for blue concentrate connector
6. Concentrate connector, red
7. Concentrate connector, blue

MACHINE EXTERNAL COMPONENTS | Fluid Part



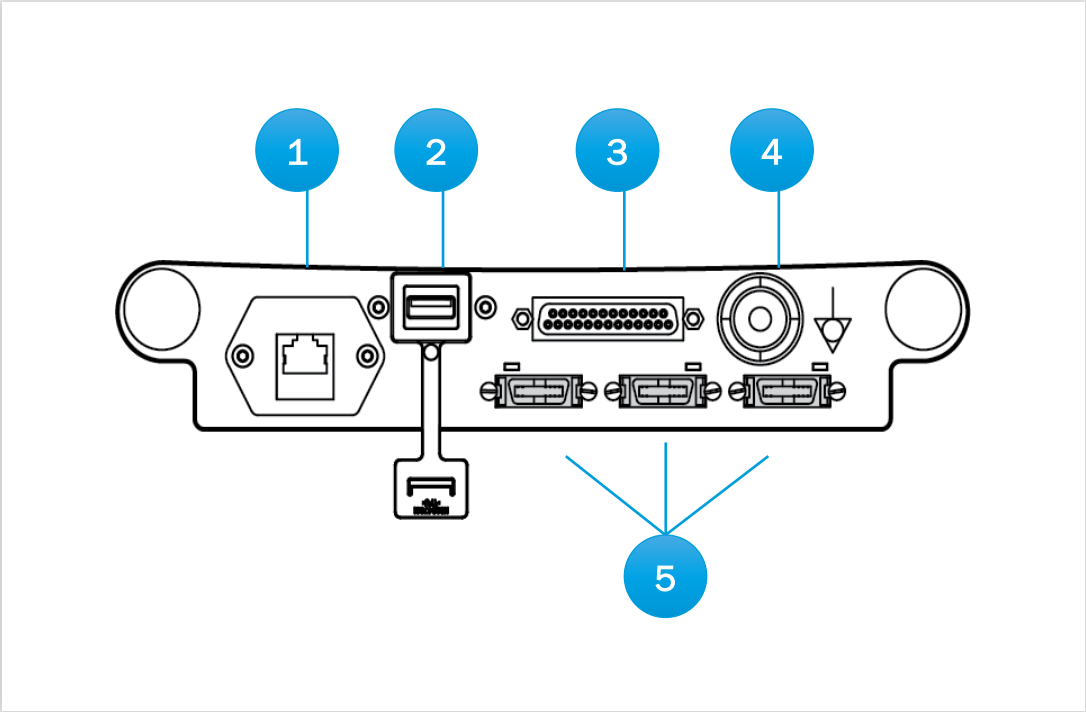
1. Pick-up tube
2. Pick-up tube holder
3. **BiCart** cartridge holder
4. Blood leak detector
5. Ultrafilter
6. Leakage detector tray

MACHINE EXTERNAL COMPONENTS | Rear



1. Transportation handle
2. Air filters
3. Inlet water tube
4. Outlet tube (drain)
5. Citric acid inlet tube
6. Mains connection
7. Fuses
8. Main switch

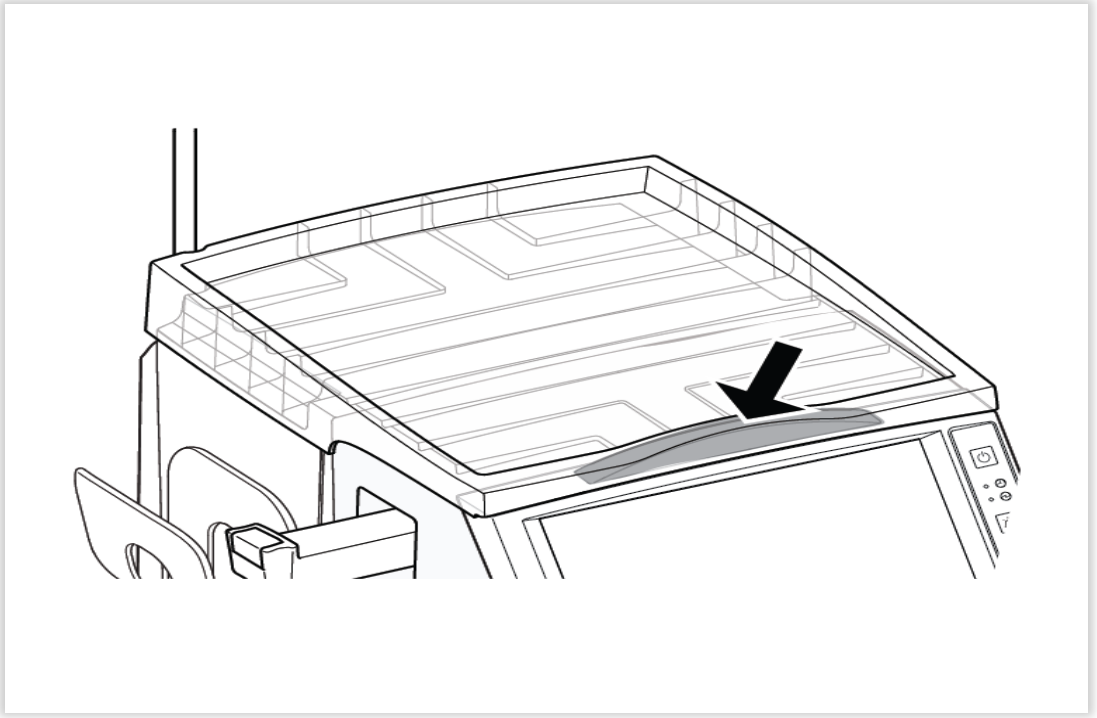
MACHINE EXTERNAL COMPONENTS | Rear



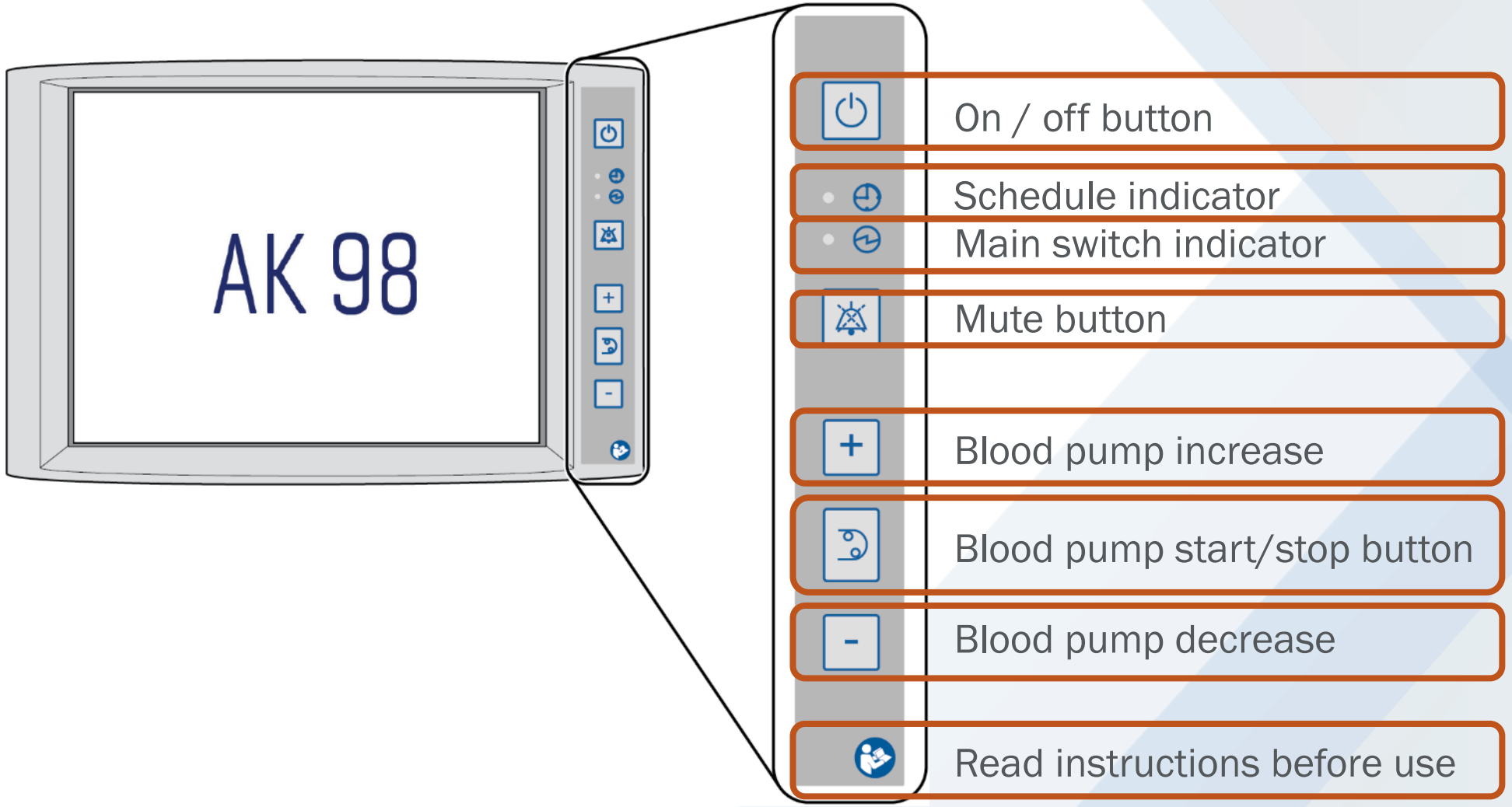
1. Ethernet port
2. USB port
3. External communication port
4. Potential equalisation connection
5. Remote panel contacts

THE OPERATOR'S PANEL | Alarm Indication Light

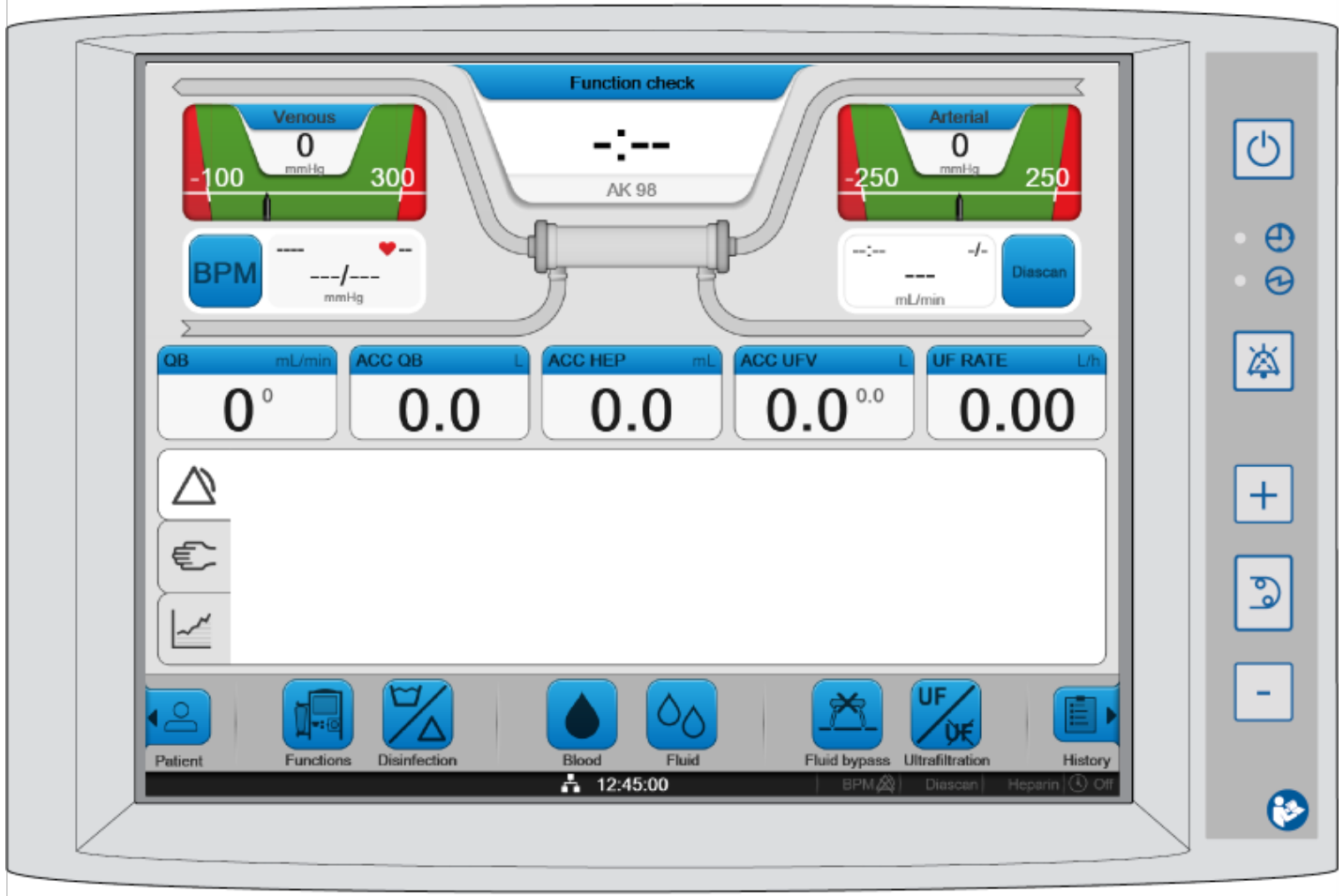
- The machine has an **alarm indication light** placed on the top of the operator's panel.
- It can either be a **blue**, **yellow** or **red** flashing light, depending on the attention or alarm status.
- When there is no information to display, the light is off.



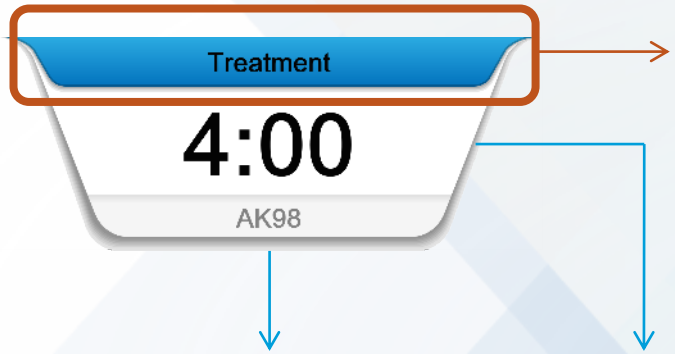
THE OPERATOR'S PANEL | Hard Buttons



THE OPERATOR'S PANEL | Touch Screen Layout



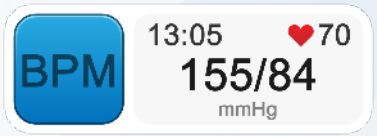
THE OPERATOR'S PANEL | Touch Screen Buttons



The **machine state indicator** shows the current state of the machine; functional check, treatment or disinfection.

It is possible to set a customized name, or identifier for the machine.

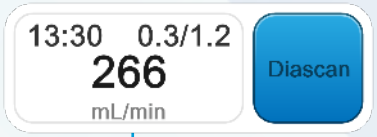
The **time indictor** shows in h:mm the remaining time in different machine states.



The **BPM read-out field** shows the latest reading. Pressing it performs a single BPM reading.

The **BPM button** opens the blood pressure menu.

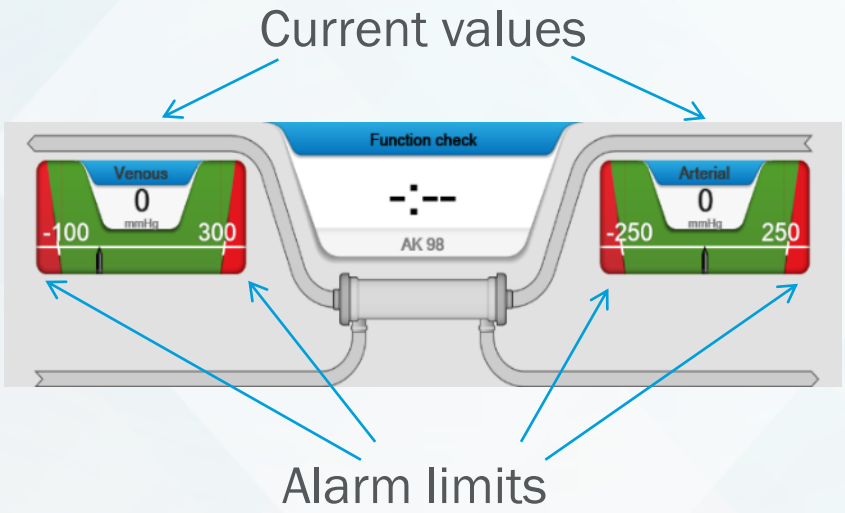
The **Diascan button** opens the **Diascan** menu.



The **clearance read-out field** shows the data from the last performed **Diascan** monitoring system.

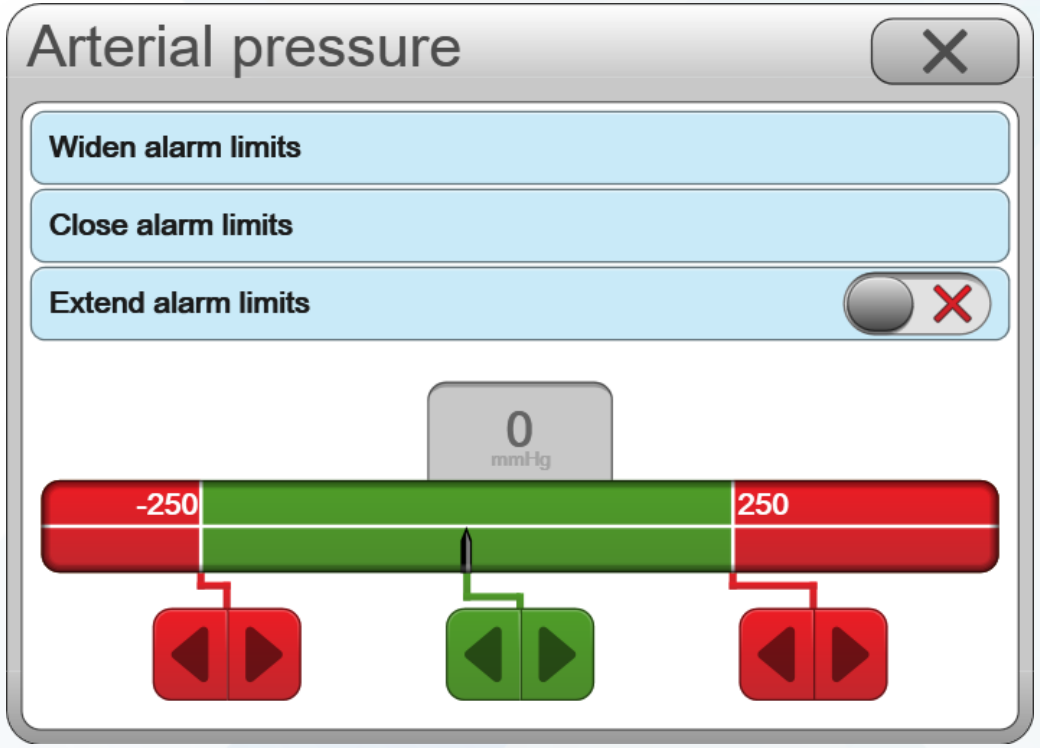
THE OPERATOR'S PANEL | Arterial and Venous Pressure Controls

The arterial and venous pressure controls show the current pressure as a numerical value and graphically as the grey pointer. The values in white text are the alarm limits, beyond these points, alarms will be generated.



Pressing each area, when they are not flashing, opens the settings boxes where the alarm limits can be adjusted.

THE OPERATOR'S PANEL | Direct Actions to the Alarm Limits



Move the lower alarm limit up/down using the red left and right arrows

Move the entire alarm window up/down using the green left and right arrows

Move the upper alarm limit up/down using the red left and right arrows

→ **Widen** both the arterial and venous alarm limits to their widest point.

→ **Centralize** the arterial and venous pressures around the current value.

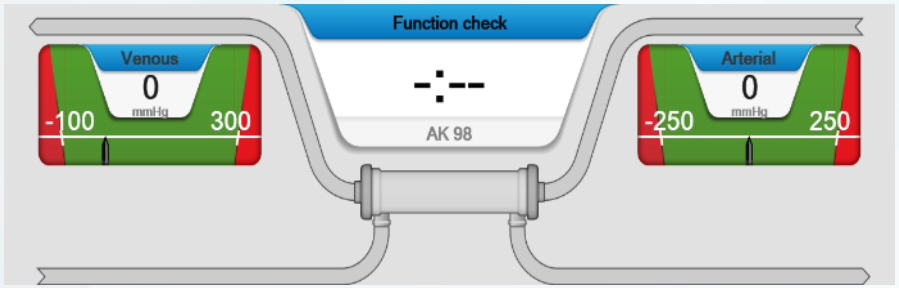
→ **Extend the alarm windows** for the arterial and venous pressures.

This functionality will automatically be deactivated as soon as the treatment is finished.

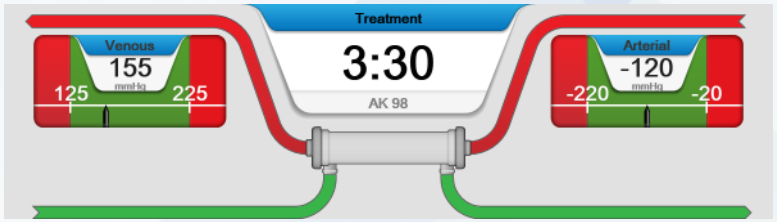
THE OPERATOR'S PANEL | Flow Paths

Depending on the status of the machine the flow paths are lit in different colors.

Function Check



Treatment

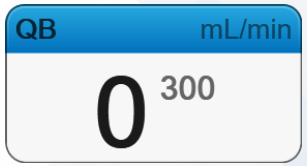


Bypass

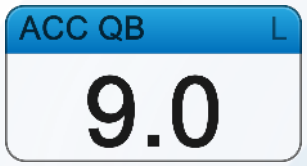
Isolated ultrafiltration

Incorrect dialysis fluid

THE OPERATOR'S PANEL | Treatment Overview Fields



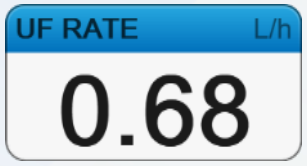
Blood flow rate in mL/min. Pressing it opens the blood menu.



Accumulated blood volume treated in L. Pressing it opens the blood menu.

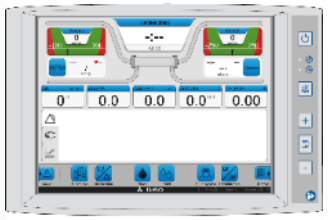
Accumulated heparin volume delivered in mL. Pressing it opens the blood menu.

Accumulated ultrafiltration volume in L. Pressing it opens the fluid menu.



Ultrafiltration rate in L/h. Pressing it opens the fluid menu.

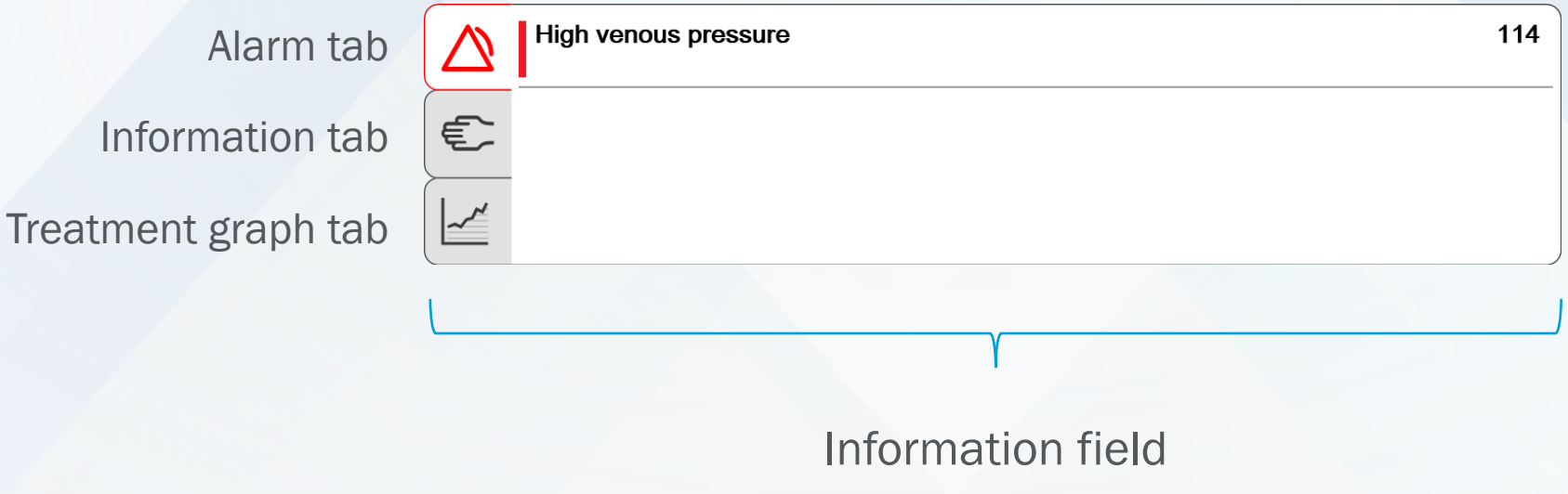
THE OPERATOR'S PANEL | Alarms, Attentions & Graphs



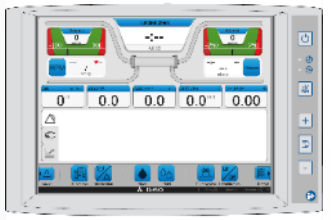
When the machine has information to display to the operator it can be found in the **information field**.

- If it is an alarm then the **alarm tab** will be flashing.
- If it is an attention or operator message then the **information tab** will be flashing.

The **treatment graph tab** opens the treatment graphs, where key treatment parameters are displayed in a graphical format.



THE OPERATOR'S PANEL | Status Information Bar



The status information bar is found at the bottom of the screen. When text appears in grey on the bar that function is not activated. Text in white shows active functions.

The icons that appear on the status information bar are;

- Sodium, Bicarbonate and UF profiling
- Isolated UF
- Network connection
- Actual time
- BPM measurement
- **Diascan**
- Heparin

The clock icon indicates that the machine is set for an auto process.

The BPM alarm off icon tells you that the BPM alarms have not been set

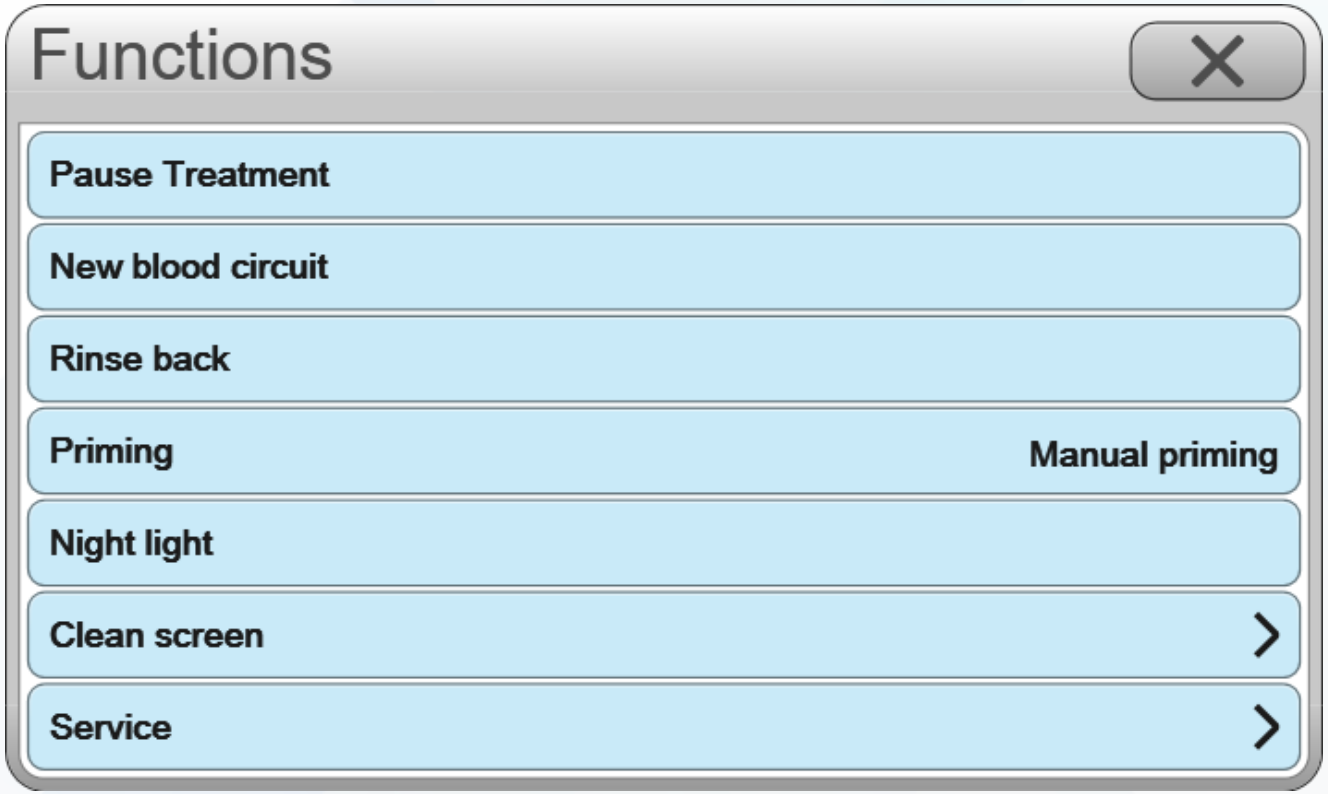
The network connection icon is solid white when connected and has a grey outline when not connected

THE OPERATOR'S PANEL | Touch Screen Buttons

- The patient button opens the patient page where information regarding the patient is handled.
- The available functionality will depend on the CIS (Clinical Information System) in use in the clinic.

THE OPERATOR'S PANEL | Touch Screen Buttons

- The functions button opens the functions page.



→ Pause the ongoing treatment

→ Change to a new blood circuit during an ongoing treatment

→ Start the rinse back procedure

→ Select manual or Assisted priming

→ Turns off the Operator's panel*

→ Allows the screen to be cleaned

→ Opens the service menu

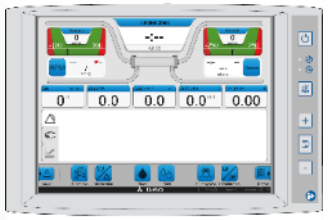
* If the Operator's panel is pressed or in case of any alarms/attentions, the Operator's panel is reactivated

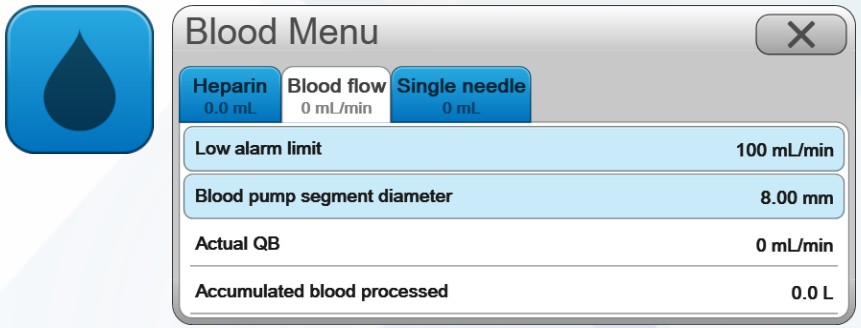
THE OPERATOR'S PANEL | Touch Screen Buttons

- The **disinfection/rinse button** opens the disinfection/rinse menu where the different disinfection/rinse programs can be selected and activated.

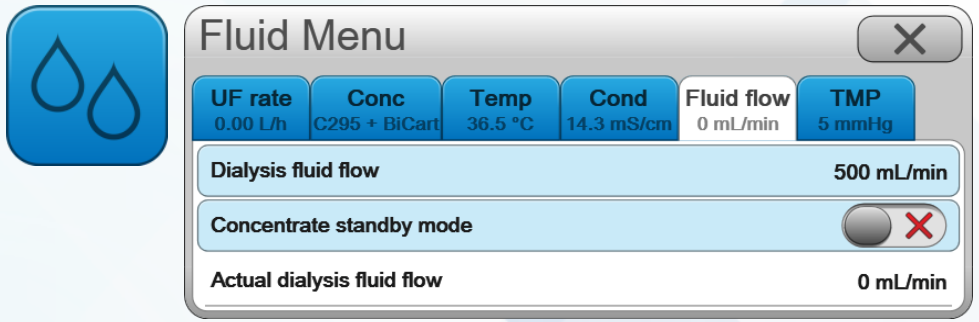
- Also, the **disinfection history tab** can be found here as well as e.g. the ultrafilter data incl. confirmation of ultrafilter replacement in the tools tab.

THE OPERATOR'S PANEL | Touch Screen Buttons



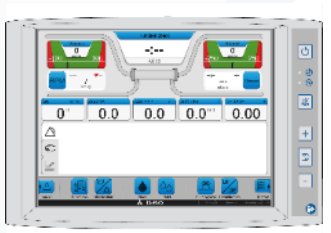


The **blood button** opens the blood menu, which contains the tabs used for setting parameters relating to blood.



The **fluid button** opens the fluid menu, which contains the tabs used for setting parameters relating to fluid.

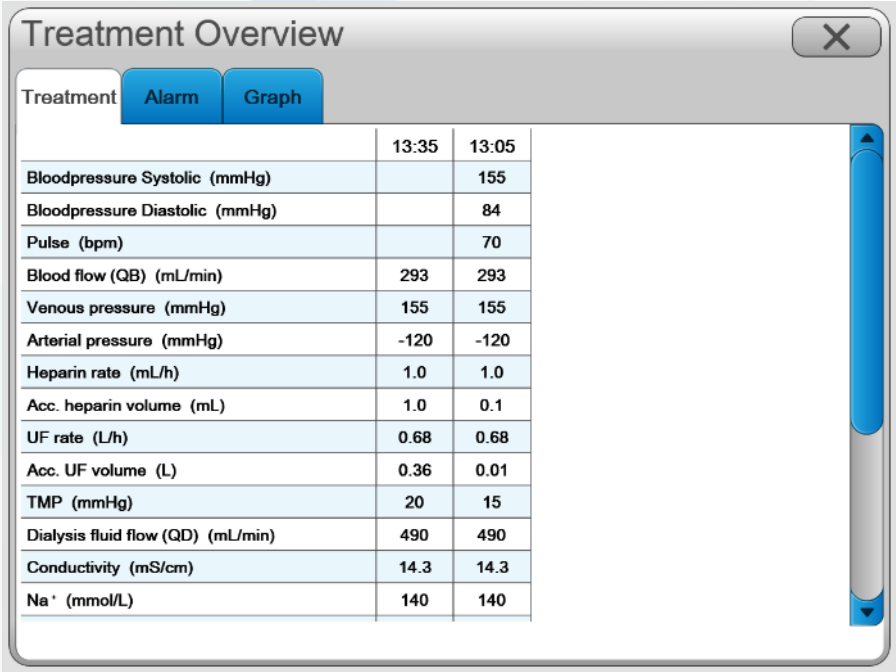
THE OPERATOR'S PANEL | Touch Screen Buttons



When the **fluid bypass button** starts to flash, the dialysis fluid is ready and in bypass. This can be also seen on the fluid flow path.

When the **ultrafiltration button** is lit, ultrafiltration is performed. This can be confirmed by looking at the value in the UF rate treatment overview field.

The **history button** opens the treatment history page. Here the treatment and alarm history and the treatment graphs are displayed.

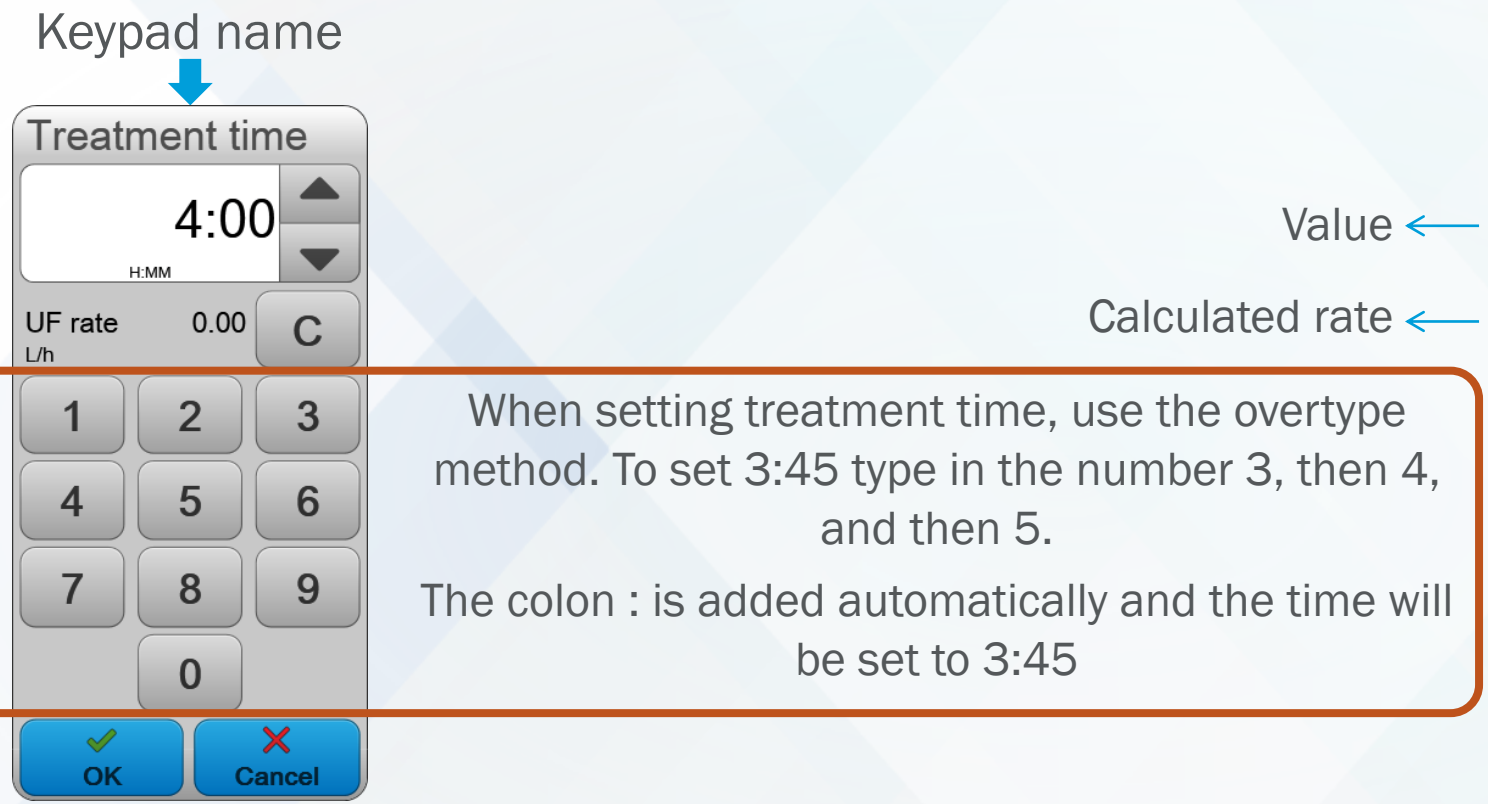


	13:35	13:05
Bloodpressure Systolic (mmHg)		155
Bloodpressure Diastolic (mmHg)		84
Pulse (bpm)		70
Blood flow (QB) (mL/min)	293	293
Venous pressure (mmHg)	155	155
Arterial pressure (mmHg)	-120	-120
Heparin rate (mL/h)	1.0	1.0
Acc. heparin volume (mL)	1.0	0.1
UF rate (L/h)	0.68	0.68
Acc. UF volume (L)	0.36	0.01
TMP (mmHg)	20	15
Dialysis fluid flow (QD) (mL/min)	490	490
Conductivity (mS/cm)	14.3	14.3
Na^+ (mmol/L)	140	140

THE OPERATOR'S PANEL | Menus

All of the menus are handled in the same manner described here

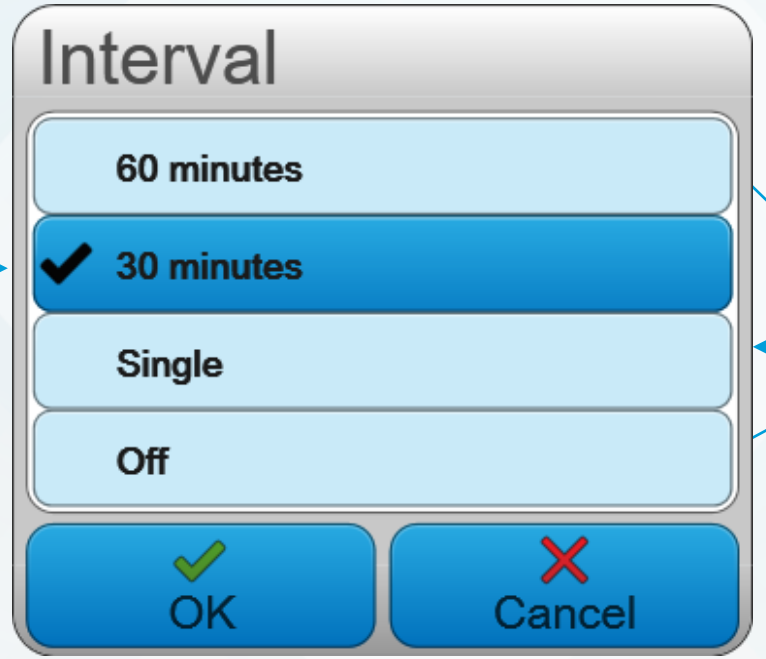
THE OPERATOR'S PANEL | Setting Parameters Keypad



THE OPERATOR'S PANEL | Setting Parameters Selectpad

Some of the machine parameters can also be set using a selectpad.

The dark blue bar and check mark show the selected parameter



To change press one of the light blue bars.

Press OK to confirm a change or cancel to exit.

End of Introduction Module

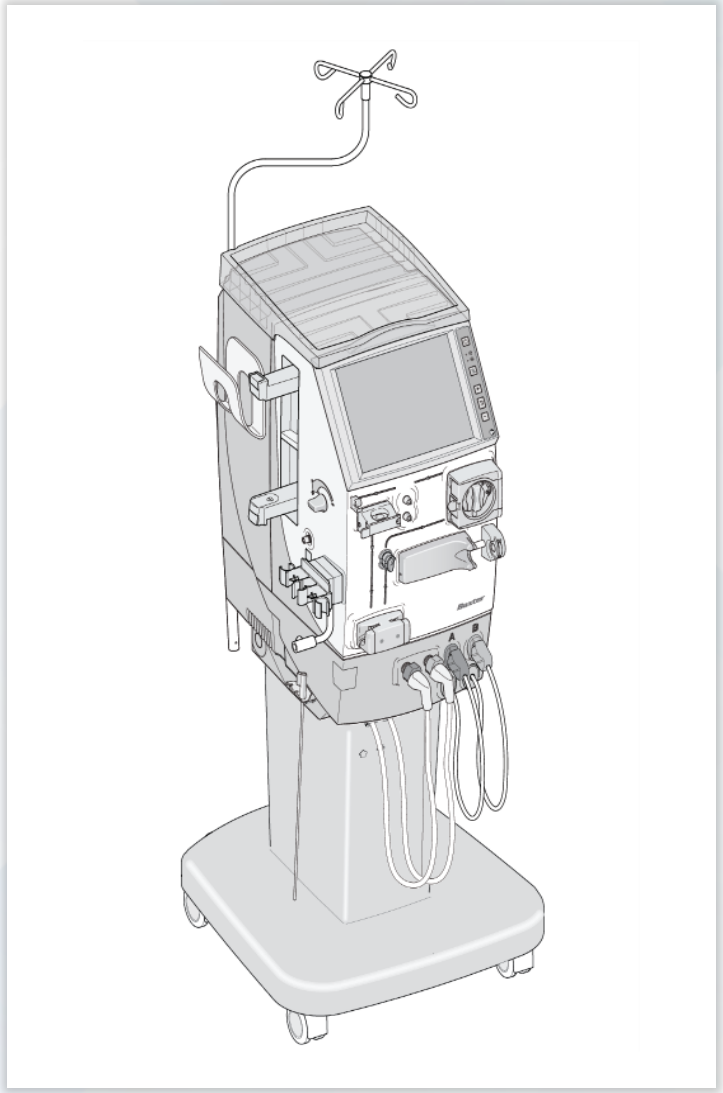
AK 98 Dialysis Machine

Preparation module

Reference: AK 98 Operator's Manual 3.xx
Chapters 4 & 12

Baxter

AK 98 DIALYSIS MACHINE



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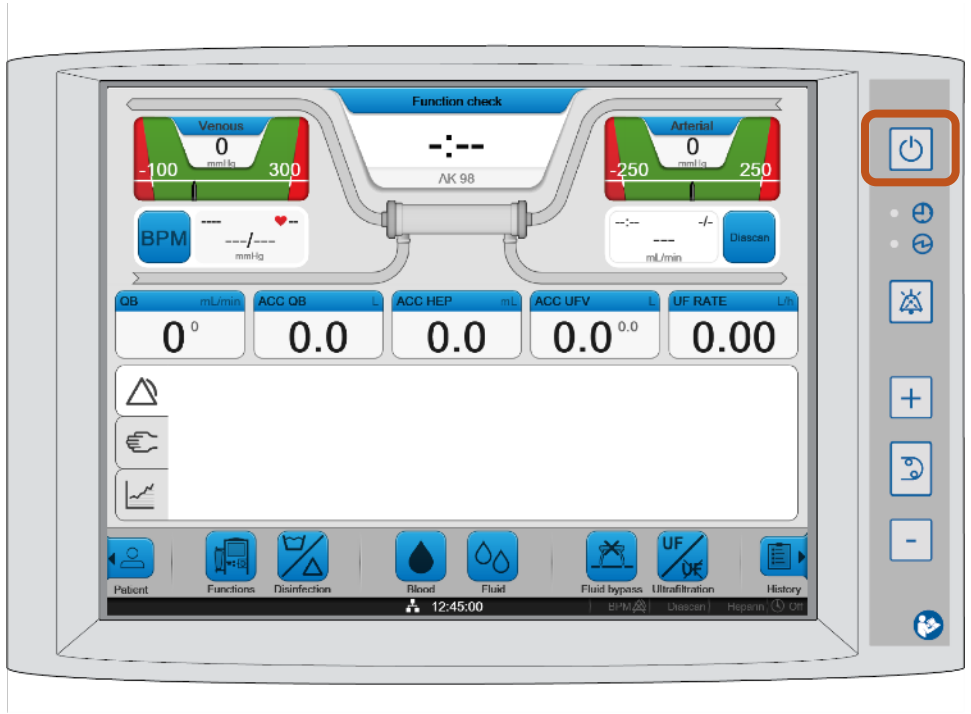
LEARNING OBJECTIVES

The aim of this module is to obtain an overview of the **AK 98** dialysis machine with special focus on:

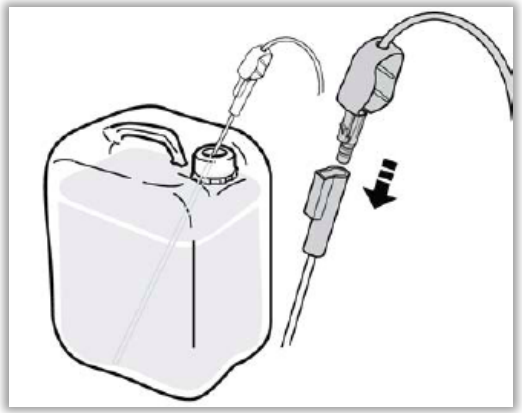
- Attaching the concentrates
- Attaching the blood lines and heparin syringe
- Priming the extracorporeal circuit
- Setting the treatment parameters

PREPARING THE MACHINE | Switch On & Functional Check



- Check the connections to water/drain and electricity, and then switch the machine on by lightly pressing the On/Off button.
- The functional check will start, the lights of the operator's panel hard buttons, the screen, the alarm indication light and the buzzer will be tested first.
- The program version will be shown on the start-up screen, then the treatment screen will be shown. Function check will appear in the machine state indicator.

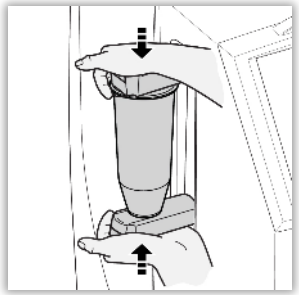
PREPARING THE MACHINE | Concentrates



- Turn the red concentrate connector clockwise and then remove it from the stand-by port of the machine.
- Connect the red concentrate connector to a pick-up tube until a ‘click’ is heard.
- Place the pick-up tube into the proper acidic concentrate container.
- Confirm the concentrate combination.

- Press the release buttons.
- Open the upper latch of the **BiCart** cartridge holder.
- Pull it outwards and upwards.
- Open the lower latch.

- Place the bottom port of the **BiCart** cartridge into the hole of the lower latch.

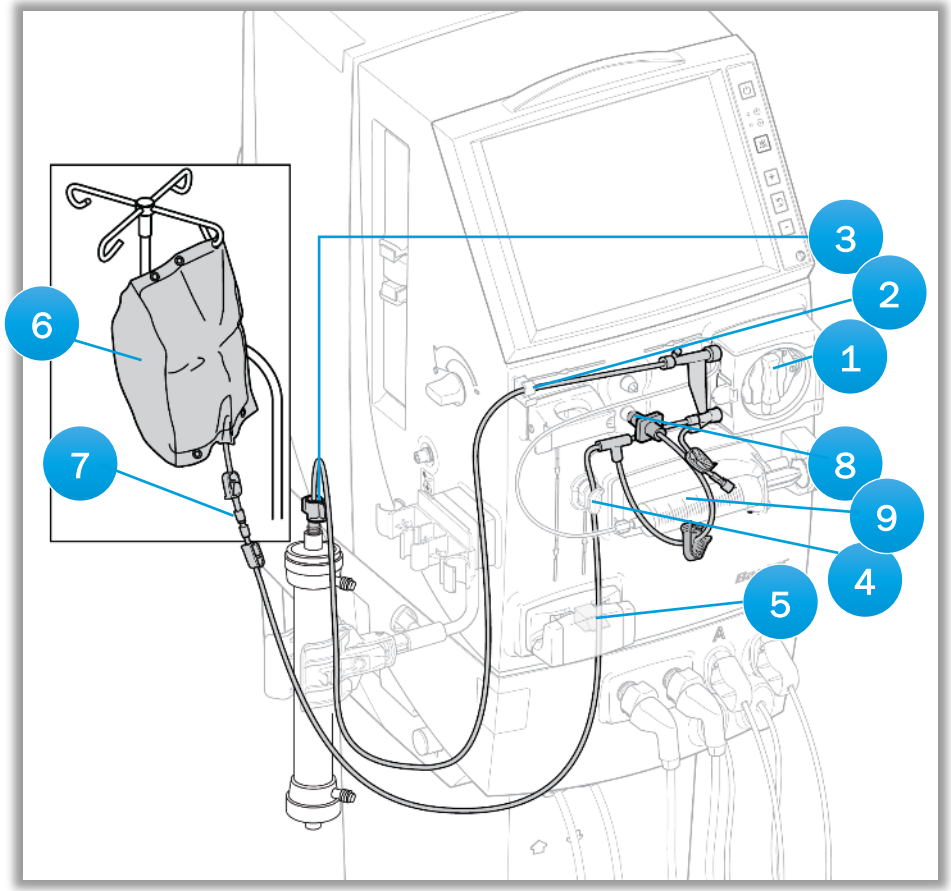


- Bring down the upper latch to align the hole with the top port of the **BiCart** cartridge.

PREPARING THE MACHINE | Arterial Blood Line

The machine is ready to be lined once the blood pump button is flashing.

NOTE: The connectors of the arterial blood line are red, but the blood lines may differ in appearance

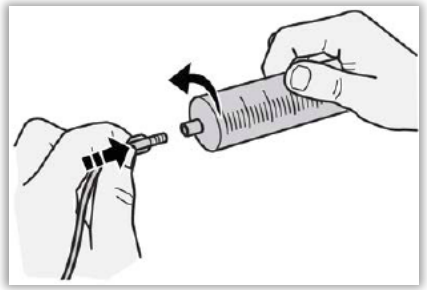


1. Blood pump*
2. Blood line guide
3. Dialyzer connection
4. Blood line guide
5. Arterial line clamp
6. Saline or priming bag
7. Arterial patient connector
8. Arterial pressure transducer connector
9. Heparin pump

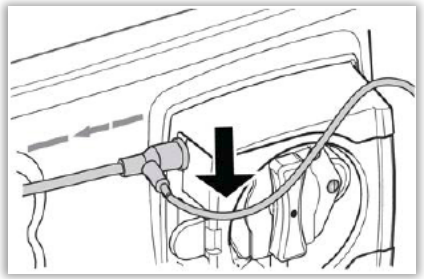
*Make sure the blood pump segment collars are outside the pump housing and that the heparin line is placed on top

NOTE: To achieve the correct blood flow, ensure that the inner diameter of the blood line pump segment of the blood line used corresponds to the set blood line pump segment diameter on the machine

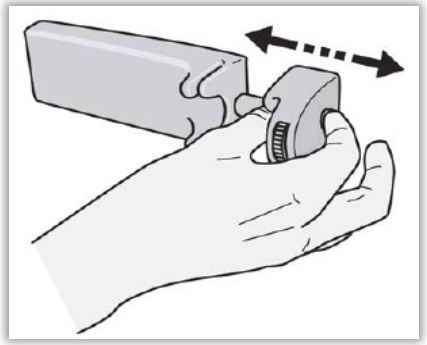
PREPARING THE MACHINE | Attach the Heparin Syringe



Connect the prepared luer lock syringe to the heparin line



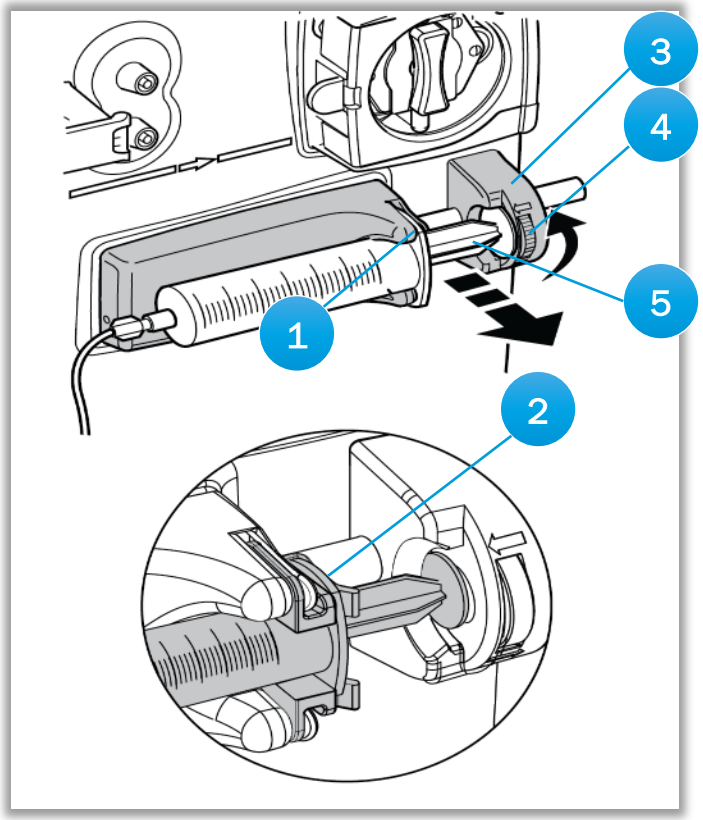
Manually prime the heparin solution all the way up to the arterial blood line



Press in the end of the piston and move it all the way out to the right hand side

PREPARING THE MACHINE | Attach the Heparin Syringe

It is important to correctly install the heparin syringe, it should be installed as follows;



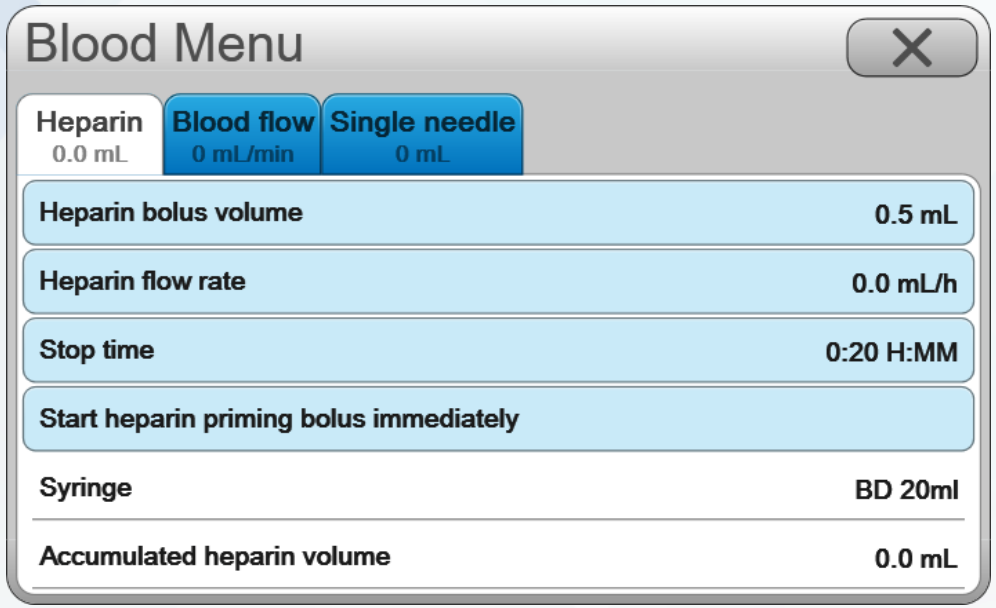
1. Insert the plastic collar of the syringe into the groove of the pump
2. **NOTE:** To be able to use a syringe with a 13 mm inner diameter, a heparin pump adapter must be installed in the heparin pump
3. Insert the plate on the end of the plunger into the groove on the piston
4. Turn the locking wheel upwards until resistance is felt
5. Check the syringe is firmly in place by lightly pulling on the plunger

PREPARING THE MACHINE | Setting the Heparin

To set the heparin:

- Press the **blood button** to open the blood menu.
- Choose the **heparin tab**.
- Pressing each of the **blue buttons** will open a keypad to set the desired value.

Note that it is possible to set a heparin bolus volume as well as a continuous heparin flow rate.

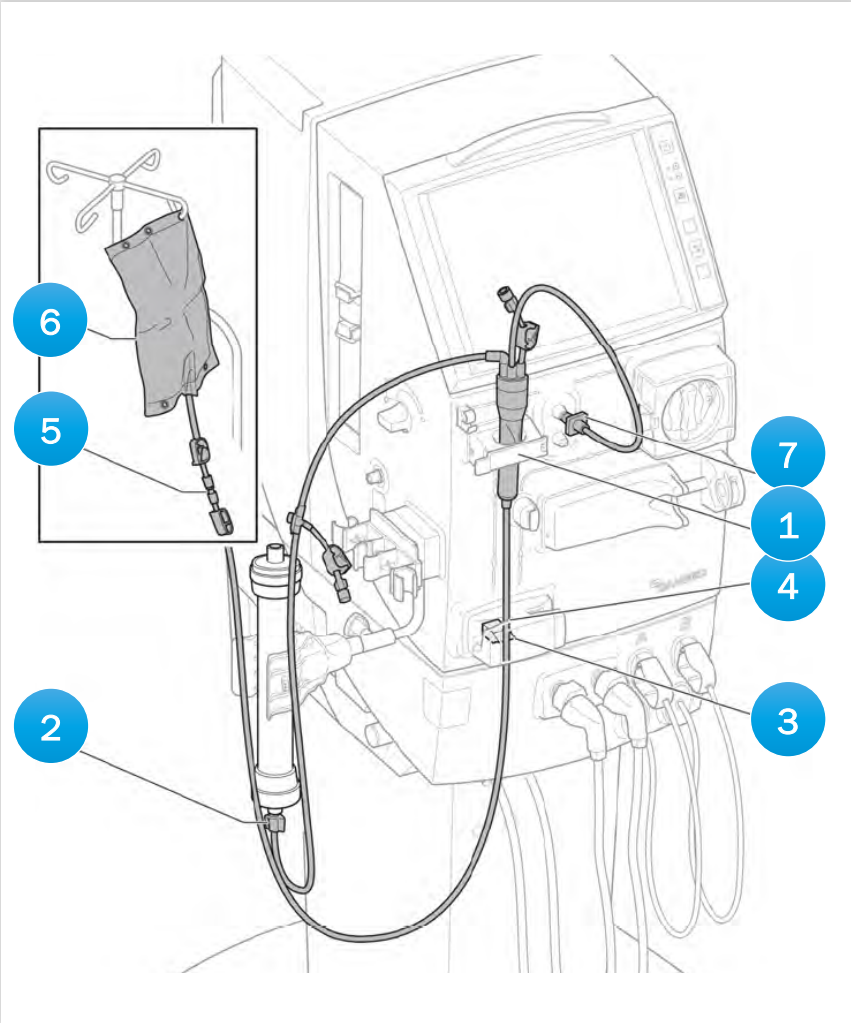


To deliver a bolus during priming

Preset brand and volume

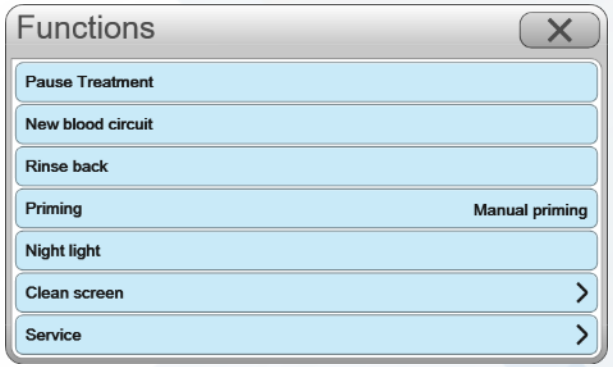
PREPARING THE MACHINE | Venous Blood Line

NOTE: The connectors of the venous blood line are blue, but the blood lines may differ in appearance



1. Air detector
2. Dialyzer connection
3. Venous line clamp
4. Priming detector
5. Venous patient connector
6. Waste bag/Prime bucket
7. Venous pressure transducer connector

PREPARING THE MACHINE | Manual Priming



- In manual priming the operator is in charge of the priming process.
  - Priming of the blood side of the circuit can start as soon as the blood pump button is flashing, and the blood lines have been attached.
  - In this case, the caps from the dialyzer blood ports should be moved to the dialyzer fluid ports to prevent spillage.
- Alternatively, priming can also be delayed so that it is completed once the machine has reached full conductivity, as displayed by the green flow path.
  - In this situation the dialysis fluid tubes of the machine can be connected to the dialyzer, while remaining in bypass, allowing the blood side priming to be started and preventing spillage.
  - The dialyzer is then rotated and the machine taken out of bypass at the appropriate point.

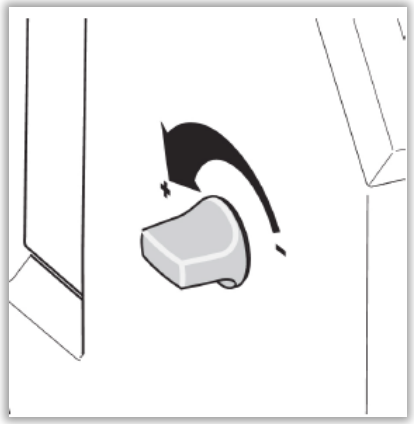
PREPARING THE MACHINE | Assisted Priming

In assisted priming the machine will guide the operator through the priming procedure.

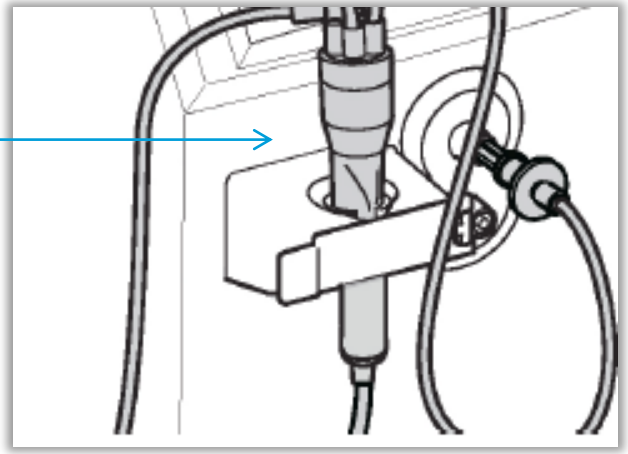
- By pressing the functions button the functions menu will be opened, the preset priming mode is shown, here its manual priming.
- It is possible to change to assisted priming using the keypad.
- Once assisted priming has been selected, the operator should follow the on screen instructions.

PREPARING THE MACHINE | Activating the Air Detector

The level of the priming fluid in the venous drip chamber should be increased during the priming phase using the adjustment knob.



Priming fluid level



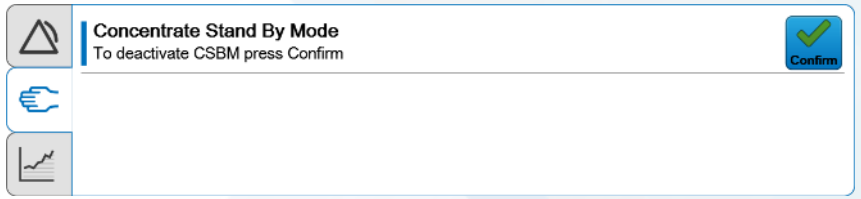
The level should be well above the air detector head. Once the level is set press the air detector icon in the information field to activate the air detector.

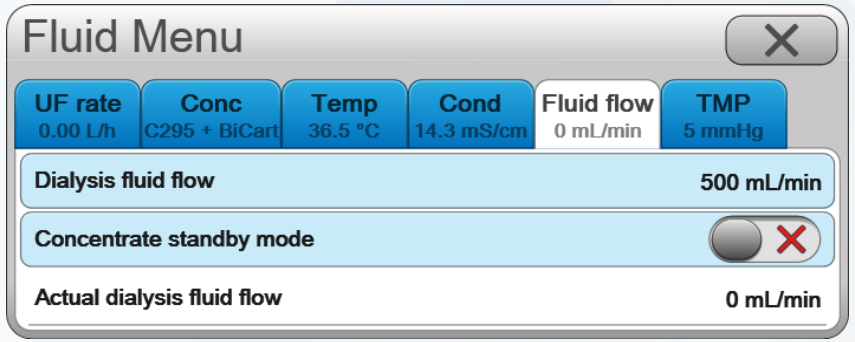
PREPARING THE MACHINE | Extra Priming & Recirculation

- It is possible after the completion of either manual or assisted priming, to perform extra priming or to recirculate the priming solution.
- For both procedures the operator must ensure that there is enough priming solution to complete the action.

- For recirculation, both ends of the blood lines must be connected together using a sterile accessory.
- The priming fluid should be connected to the circuit via an infusion line to compensate for the ultrafiltration that occurs in the dialyzer during the recirculation phase.
- When recirculation is finished or the blood pump is stopped, close the clamp on the infusion line, then press Connect patient

PREPARING THE MACHINE | Concentrate Stand-by Mode





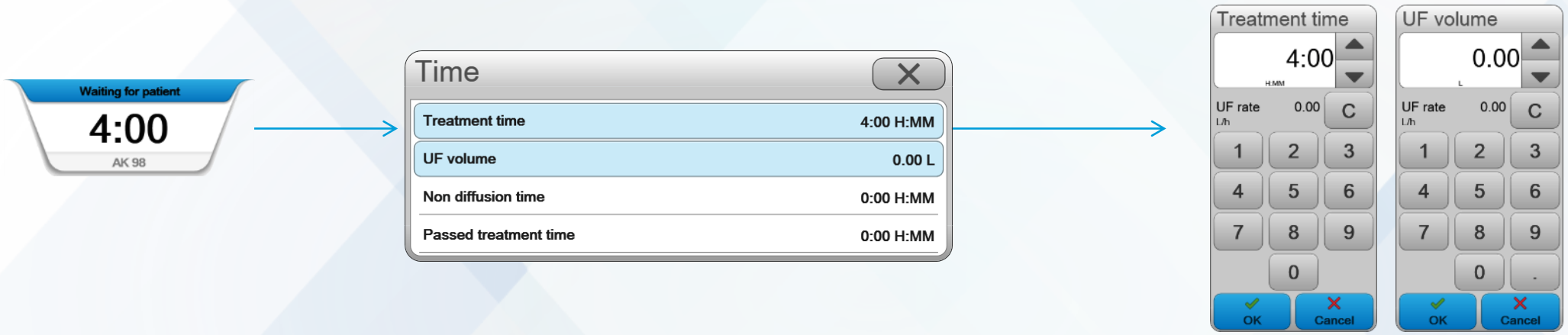
The machine can be preset to enter concentrate stand-by mode when;

1. The green fluid path is achieved, or a preset time thereafter
2. Or when the set priming volume is achieved

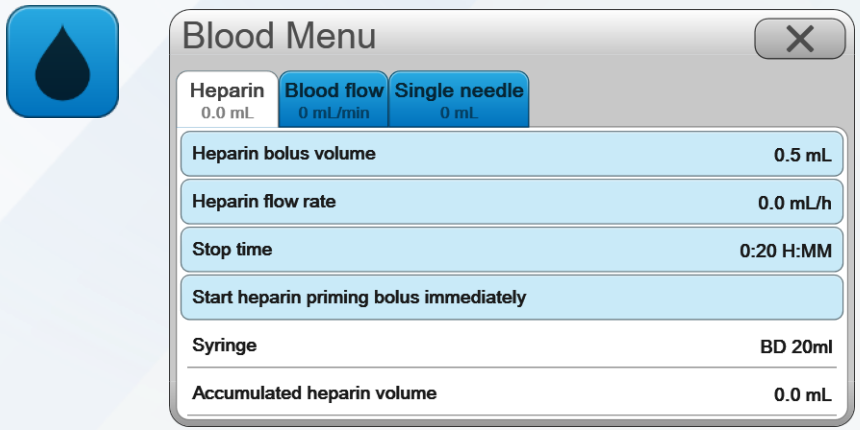
If concentrate stand-by mode has not been preset, it can be activated manually by pressing the fluid button and then activating concentrate stand-by mode in the fluid flow tab.

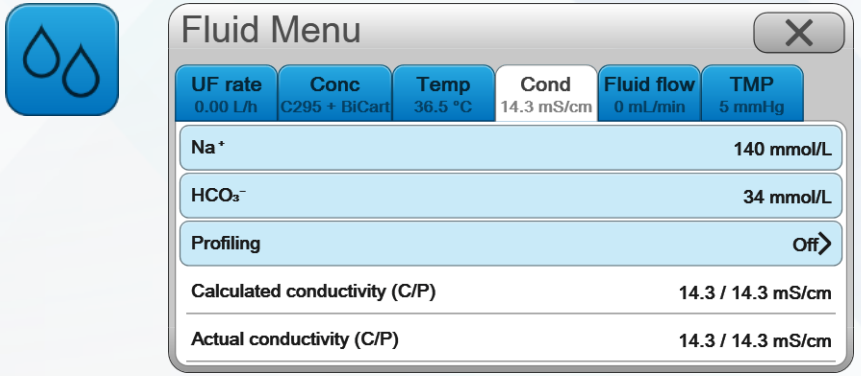
PREPARING THE MACHINE | Setting Treatment Parameters

To set the treatment parameters press the time indicator, the time menu will open, from here both the time and the UF volume can be set using the keypads.



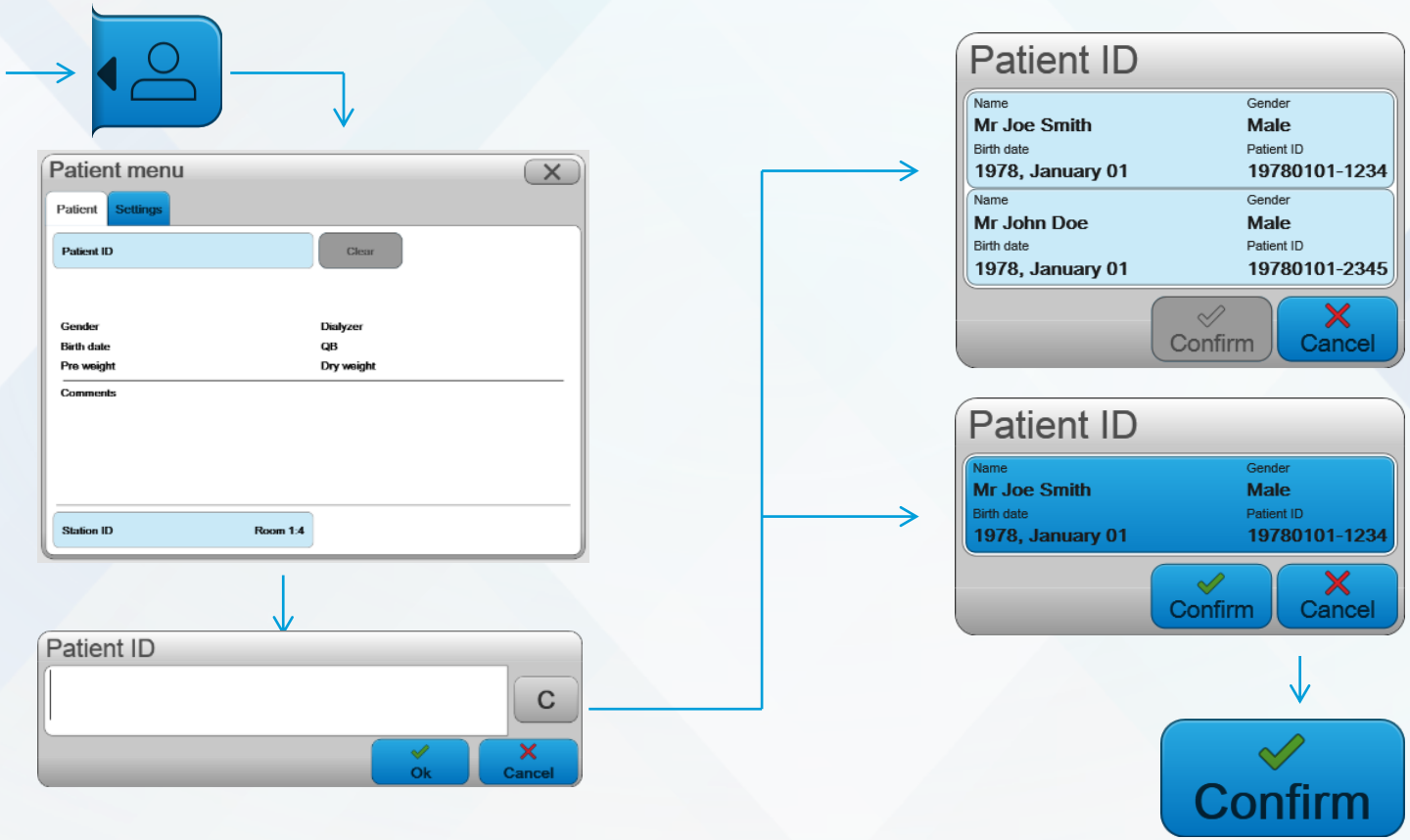
Check and adjust additional parameters by pressing the blood or fluid buttons to view their menus.





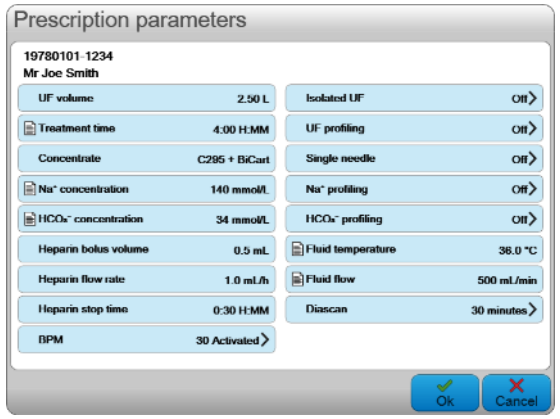
PREPARING THE MACHINE | IT Connectivity

Confirming patient ID and retrieving the patient prescription from the CIS.



PREPARING THE MACHINE | IT Connectivity

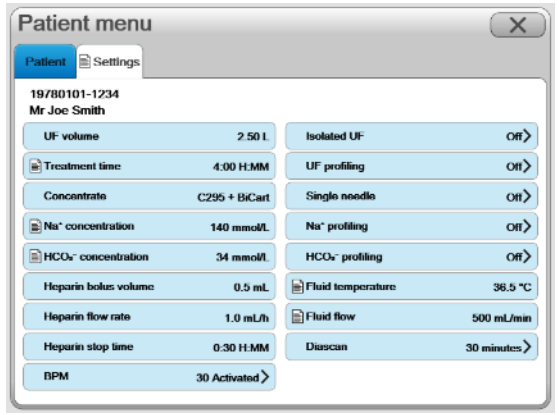
Reviewing the prescription



Prescription parameters from the CIS

CIS prescription parameters that have been **altered by the operator**

Prescription parameters with no icon are set to the machine default or preset settings



Once OK has been pressed in the prescription, then **the prescription icon will appear in the settings tab**. All parameters can still be changed by the operator by pressing on their respective blue tabs.

The **patient button** has a black check mark when OK has been pressed.

Preparing the machine | IT connectivity

Setting station ID

Using patient ID as a label

Hands on

- Connect and confirm the concentrate combination
- Attach the blood lines and heparin syringe
- Manual priming
- Priming Recirculation
- Concentrate standby mode
- Set the prescription:
  - Time 3:00
  - UF Volume 1.5 L
  - Fluid flow 600 mls/min
  - Heparin
    - Bolus 1.0 ml
    - Flow rate 1.5 mls/hr
    - Stop time 30 min

End of preparation module

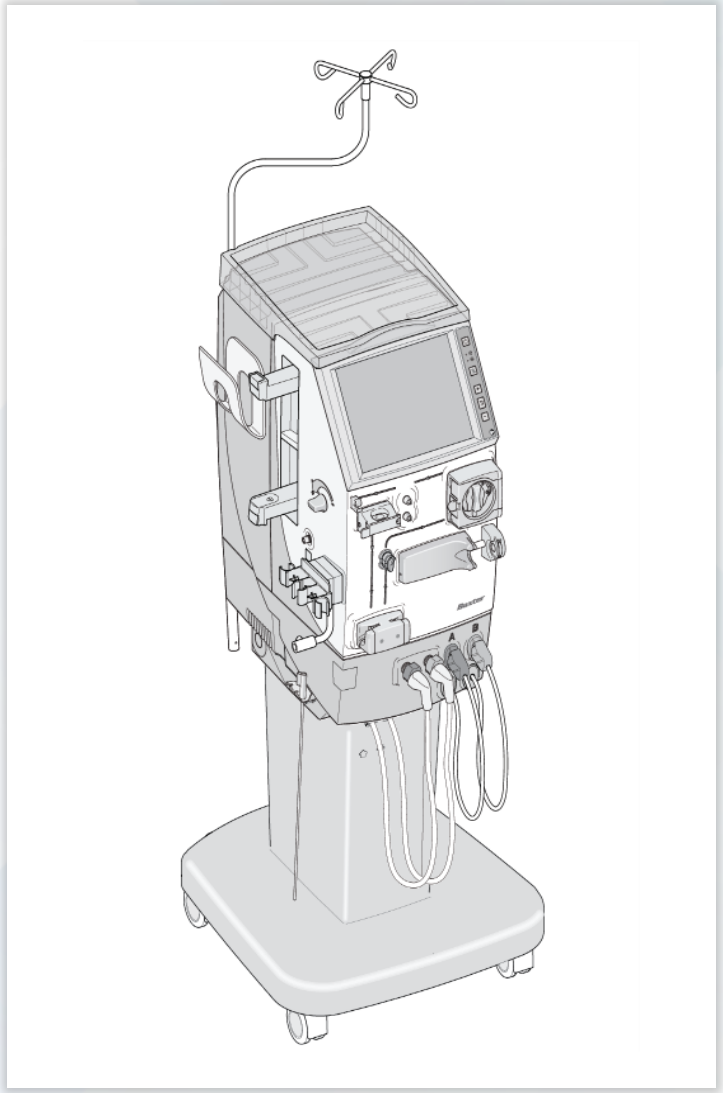
AK 98 Dialysis Machine

Treatment module

Reference: **AK 98** Operator's Manual 3.xx
Chapters 4 & 8

Baxter

AK 98 DIALYSIS MACHINE



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LEARNING OBJECTIVES

The aim of this module is to get an overview of the **AK 98** dialysis machine with special focus on:

- Connecting the patient and starting the treatment
- Actions during treatment – heparin bolus and BPM
- Pause the treatment
- End the treatment and rinseback
- Machine aftercare

HEMODIALYSIS TREATMENT | Check the Settings

- Before starting the patient treatment, the operator should carefully inspect that the machine has been lined and primed in the correct manner.
- Pay special attention to the position of the venous blood line in the priming detector, and observe that there are no kinks in the blood lines, as well as checking all of the treatment settings have been set to appropriate values for the patient.

HEMODIALYSIS TREATMENT | Connect the Patient

- The patient connection can take place with either just the arterial line connected to the patient (bleed out), or both the arterial and venous blood lines connected to the patient (straight connection).

- The operator should make all the relevant safety checks and then start the blood pump. The default blood pump speed is 100mL/min.

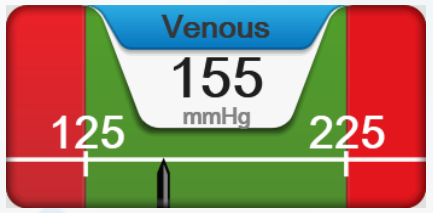
- The machine is preset by default to stop the blood pump automatically when the priming detector senses the change between the priming solution and the blood.

HEMODIALYSIS TREATMENT | Start the Treatment

- When the machine **detects blood**, by default the blood pump will stop.
- Press the **flashing blood pump button** to restart the blood pump and then use the **blood pump up and down buttons** to adjust the blood flow.
- Observe that the blood flow path is lit red.

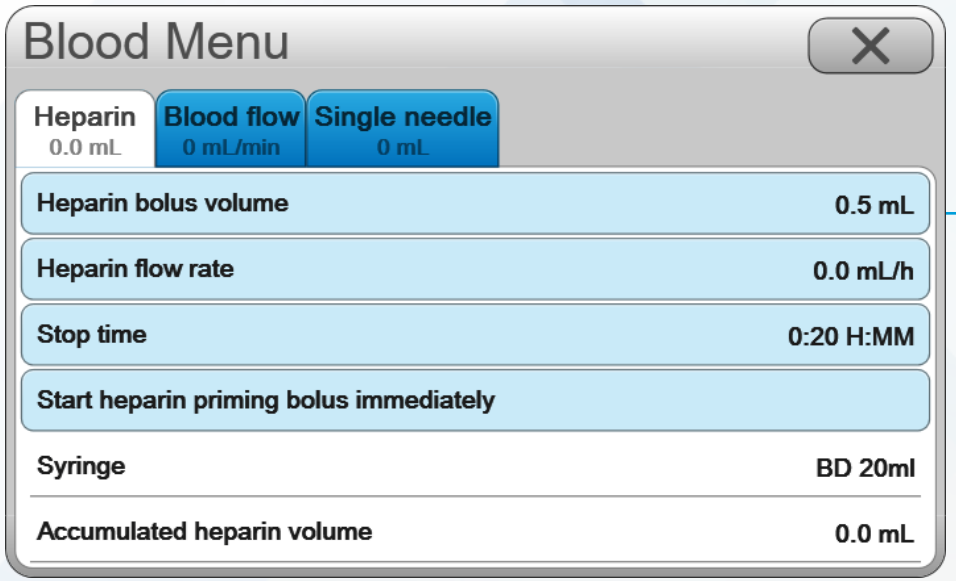
- When ready, **start the ultrafiltration**.

- The alarm arterial and venous pressure alarm limits will automatically be centralized around the actual pressures.



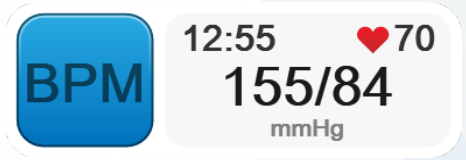
HEMODIALYSIS TREATMENT | Heparin Bolus

If an **additional bolus of heparin** is required by the patient during the treatment, this can be delivered by the machine.

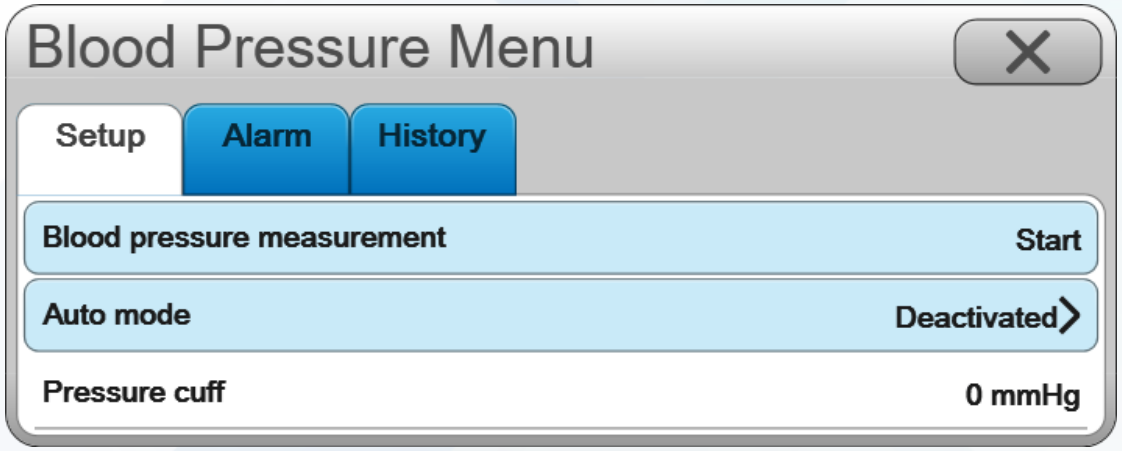


- Press the **heparin bolus volume settings bar** and use the keypad to set to correct volume.
- Once **OK** has been pressed, then the bolus will be delivered.

HEMODIALYSIS TREATMENT | BPM Single and Interval



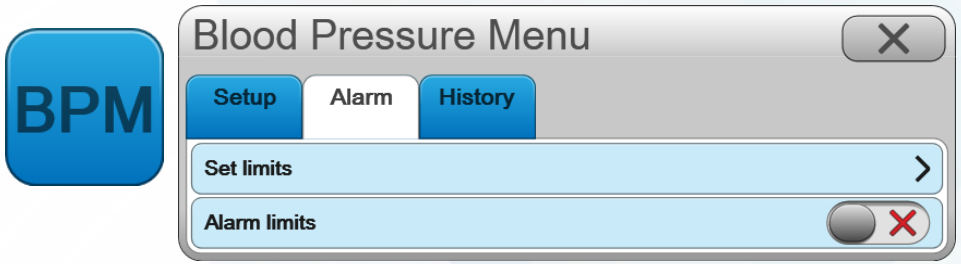
To take a **single blood pressure** reading press the BPM read out field and the measurement will start.



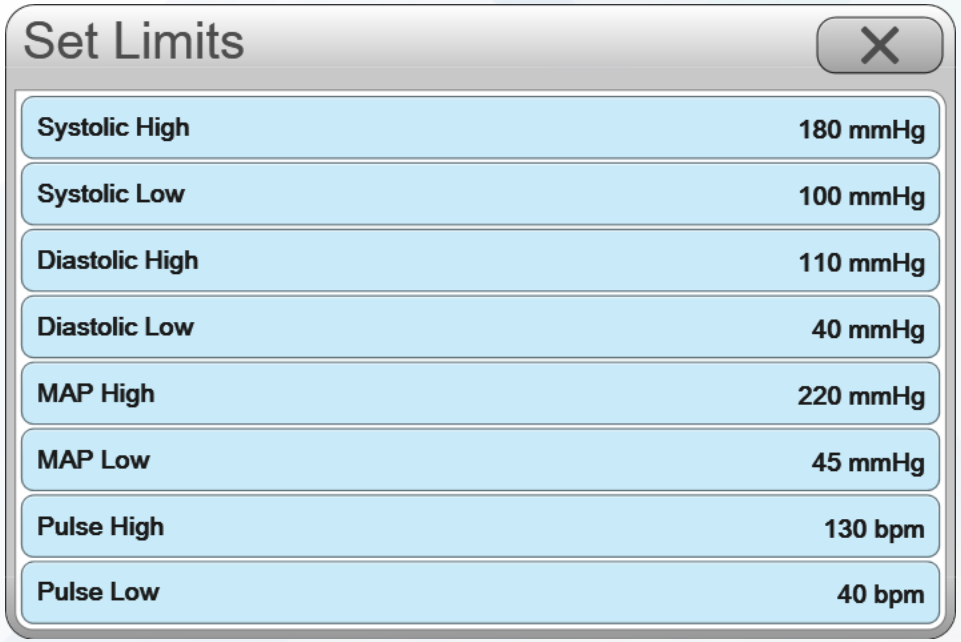
To set up **automatic blood pressure** readings open the setup tab and press the auto mode bar.

From here the **interval time** can be set between 5 and 60 minutes, press **OK** to confirm the time and **activate** to activate the automatic readings.

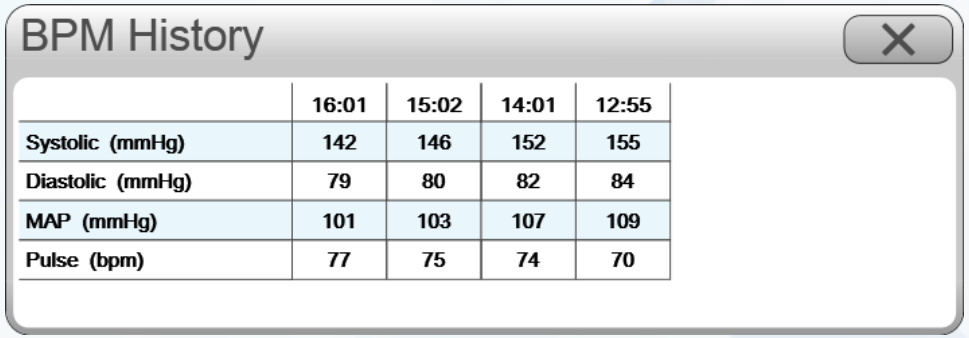
HEMODIALYSIS TREATMENT | BPM History and Alarm Limits



The blood pressure menu also has tabs for accessing the BPM alarm limits and history.



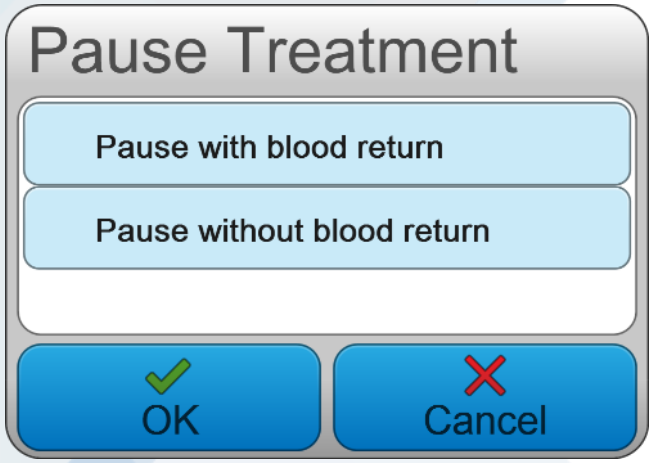
The set limits tab allows the operator to customize the alarm limits to meet the patients requirements.



	16:01	15:02	14:01	12:55
Systolic (mmHg)	142	146	152	155
Diastolic (mmHg)	79	80	82	84
MAP (mmHg)	101	103	107	109
Pulse (bpm)	77	75	74	70

The history tab within the blood pressure menu contains the data from all the blood pressure readings performed during the treatment.

HEMODIALYSIS TREATMENT | Pause the Treatment



1. Press the functions button to open the functions menu
2. Press pause treatment
3. Select pause with or without blood return and press OK
4. Follow the instructions on the screen to proceed
5. To resume the treatment, press the blood pump button to stop the blood pump
6. Select connect patient, connect the blood lines to the patient and press confirm
7. Press the blood pump button and adjust the blood flow
8. Press the ultrafiltration button to resume UF removal

When the treatment is paused:

- The blood flow rate is decreased and the arterial and venous pressure alarm windows are widened
- The elapsed time in pause is displayed and a sound alarm is triggered every 15 minutes
- **Diascan** measurements, Isolated UF and profiling is disabled
- Continuous heparinization administration and automatic BPM is deactivated but heparin bolus dose and manual BPM is enabled

HEMODIALYSIS TREATMENT | End the Treatment

- When the **treatment time** is completed the operator's is alerted by an audible buzzer, a lit alarm indication light and an attention message.

```
596 Treatment time expired
To discontinue treatment press Confirm.
```

- After pressing **confirm**, the on screen instructions should be followed.
- If the treatment needs to be finished before the set treatment time has expired, then the time needs to be reduced down to 0:00 first.
- This is done by pressing the time indicator and using the keypad to change the time.

HEMODIALYSIS TREATMENT | Rinse Back

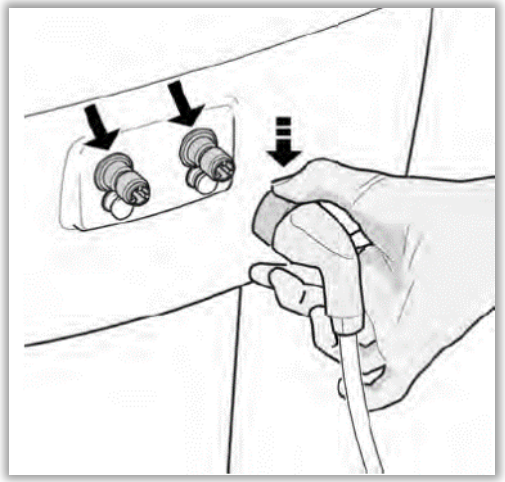
After the treatment time expired attention has been confirmed, the rinse back menu will automatically appear:

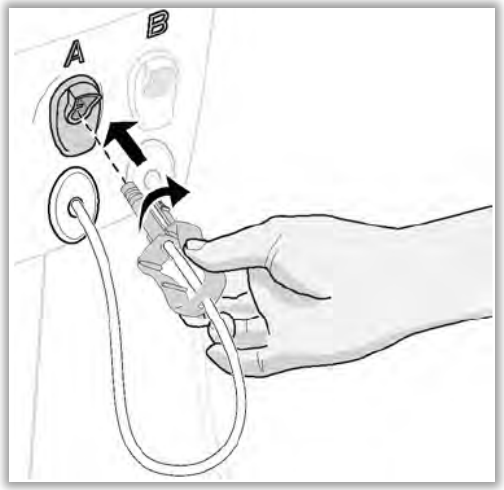
1. Press the rinse back button and confirm. The blood pump stops
2. Disconnect the arterial line from the access and connect it to the rinse back solution
3. Press the blood pump button to start the blood pump
4. The blood pump will run until either the blood is no longer detected, the preset volume is reached, or the blood pump is manually stopped by the operator.

Once the rinse back is completed there is an option to continue the rinse back or disconnect the patient.

HEMODIALYSIS TREATMENT | Machine Aftercare

- After the **end of the treatment**, once the patient has been confirmed as being disconnected from the machine, and the venous blood line has been removed from the priming detector, there will be handling instructions on the screen on how to prepare the machine for disinfection.
- The **emptying of the dialysis fluid** in the dialyzer is initiated by returning the blue dialysis fluid tube to the machine. The red concentrate connector should be inserted carefully into the stand-by port.
- By following the on-screen instructions the **BiCart cartridge can be drained by the machine**.





Hands on

- Straight connection
- Start treatment
- Heparin bolus 0.5 ml
- Single BPM measurement
- Set the BPM alarm limits
- Pause treatment
- End treatment
- Rinse back
- Drain dialyzer and BiCart cartridge

End of treatment module

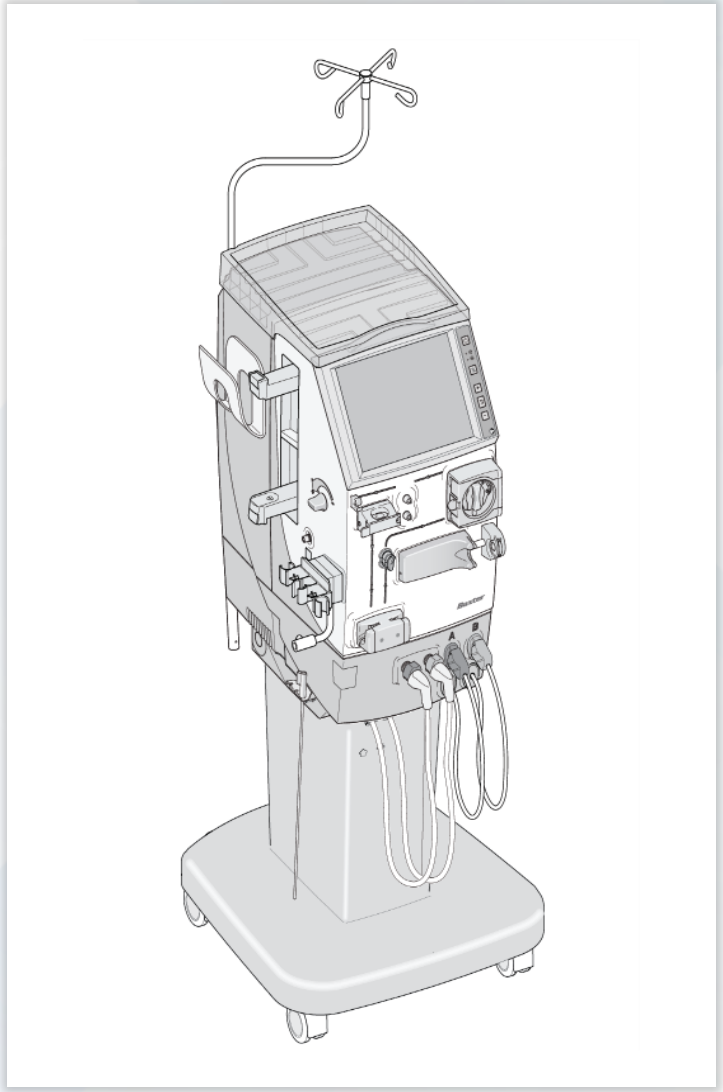
AK 98 Dialysis Machine

Isolated UF, Profiling and **Diascan** module

Reference: **AK 98** Operator's Manual 3.xx
Chapters 6, 7 & 9

Baxter

AK 98 DIALYSIS MACHINE



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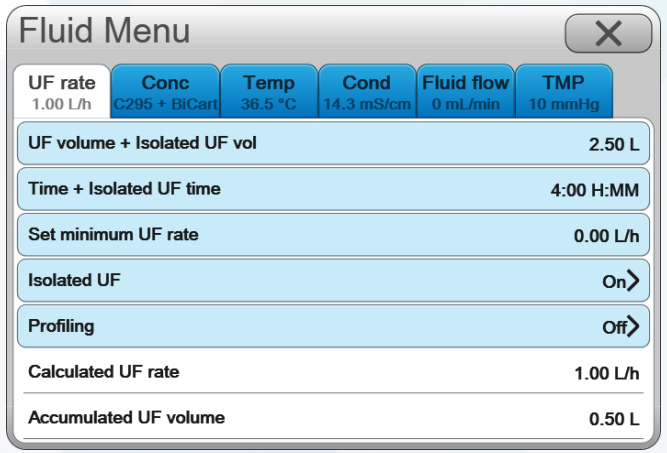
LEARNING OBJECTIVES

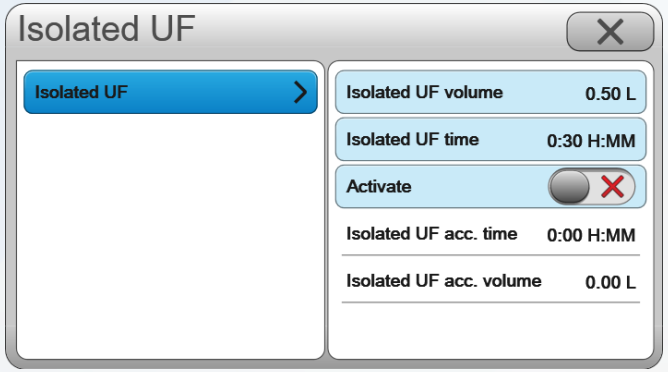
The aim of this module is to get an overview of the **AK 98** dialysis machine with special focus on:

- Isolated ultrafiltration
- Profiling – UF, sodium and bicarbonate
- **Diascan** monitoring system

FEATURE| Isolated Ultrafiltration Activation



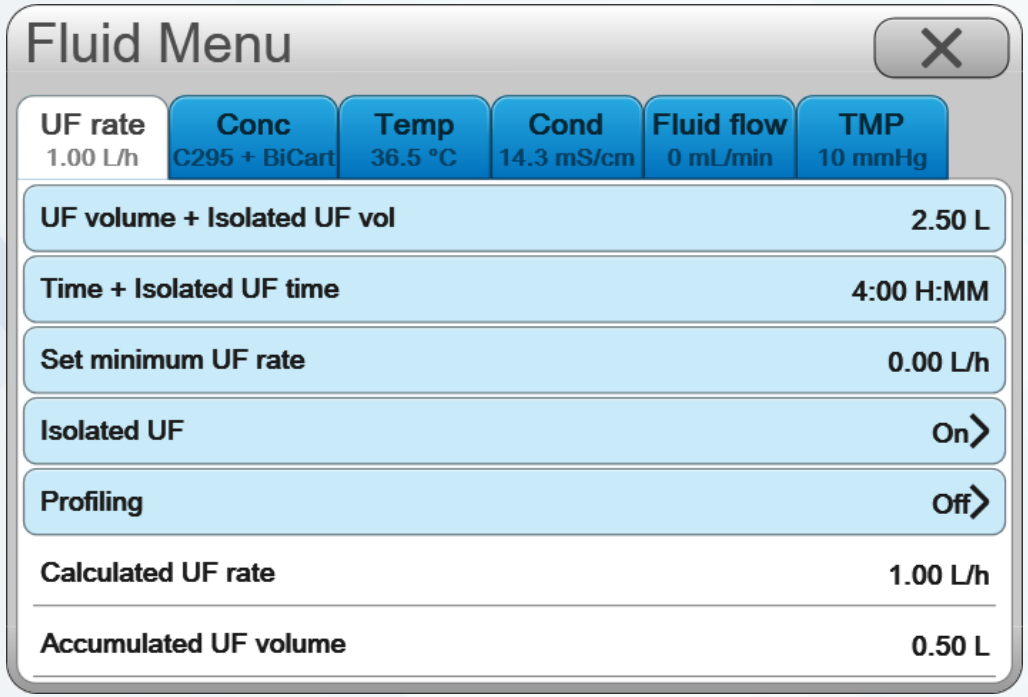
The **Isolated UF settings** are reached by pressing the **fluid button** and then **isolated UF**, in the fluid menu.



Once in the **isolated UF menu**, the time and volume for isolated UF are set and isolated UF is **activated**.

FEATURE | Isolated Ultrafiltration Activation

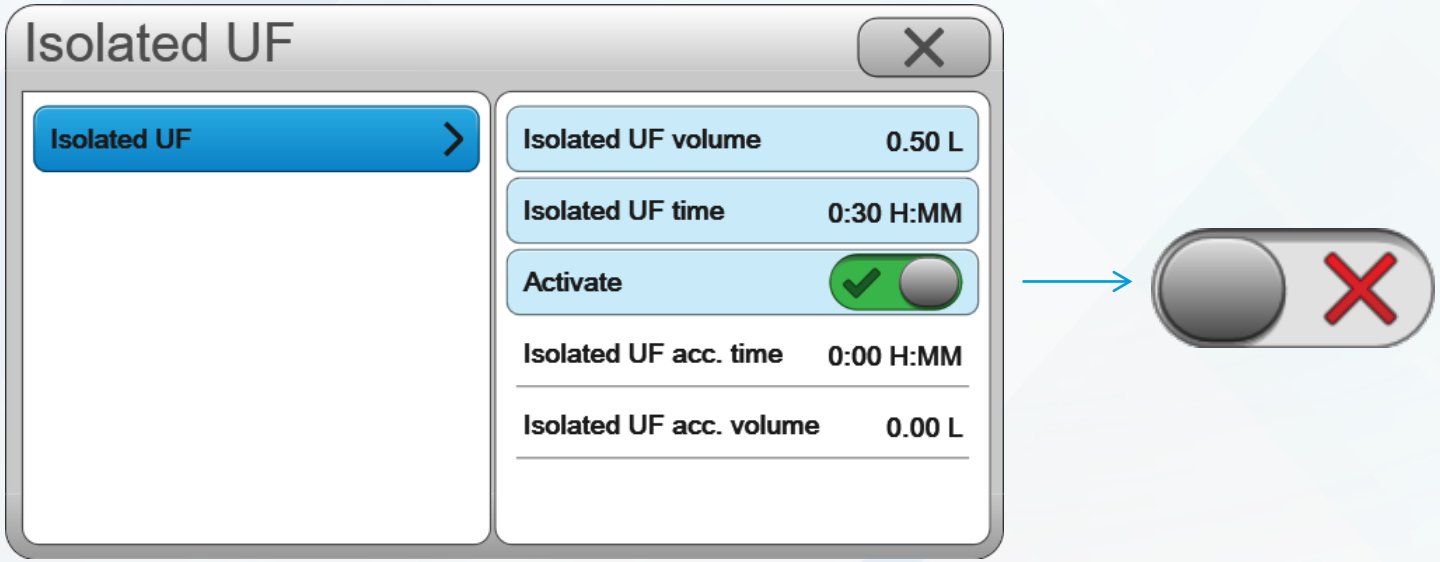
Once the isolated UF time and volume are set, they are automatically added, by default to the total treatment time and UF volume.



When the isolated UF phase is completed the machine will automatically switch into the diffusive phase.

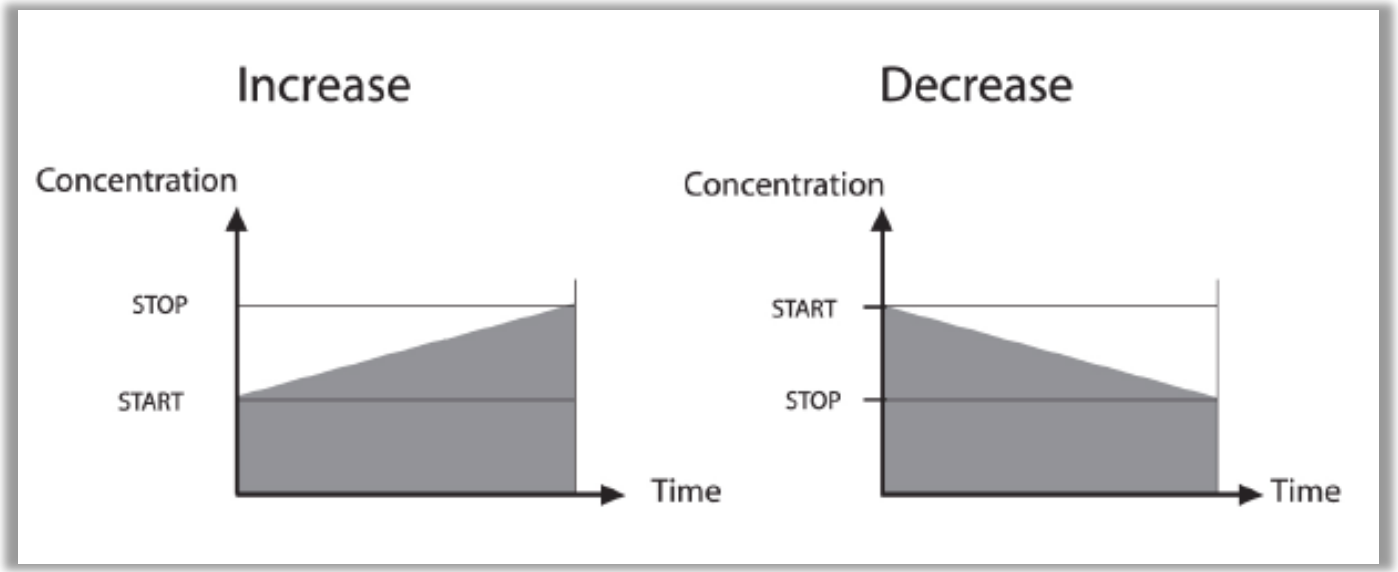
FEATURE| Isolated Ultrafiltration 2nd Phase & Deactivation

- Second and subsequent phases of isolated UF can be activated at any point during the treatment. The time and volume for the new phase must be added to the previous to create a cumulative amount.
- A currently running isolated UF phase can be deactivated at any time as required by the operator. Press deactivate in the isolated UF menu.



FEATURE | Profiling Sodium and Bicarbonate

- Both sodium and bicarbonate concentrations in the dialysis fluid can be profiled.
- They can either be profiled upwards or downwards at a smooth liner rate.



- When deactivating a profile, check the set value that the treatment will continue at.

FEATURE | Profiling Ultrafiltration

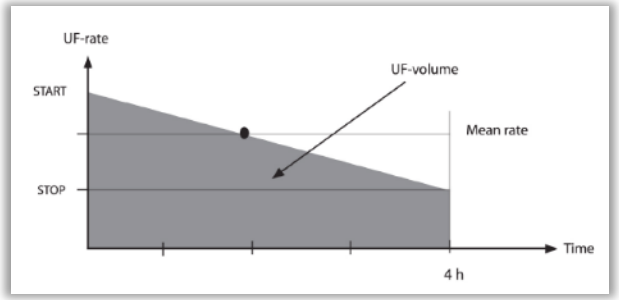
There are three profile types available for ultrafiltration profiling;

- Linear
- Step
- Interval

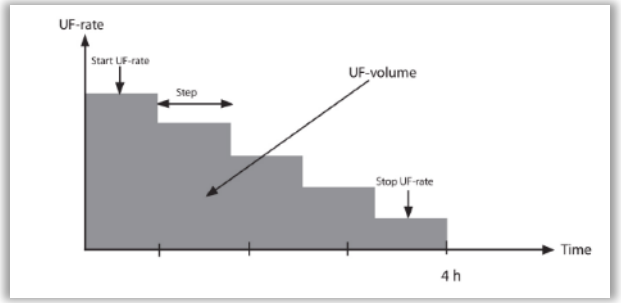
Changes to the UF are determined by;

- Total UF volume
- Treatment time
- Starting value for the UF rate
- In step mode: number of steps
- In interval mode: number of intervals

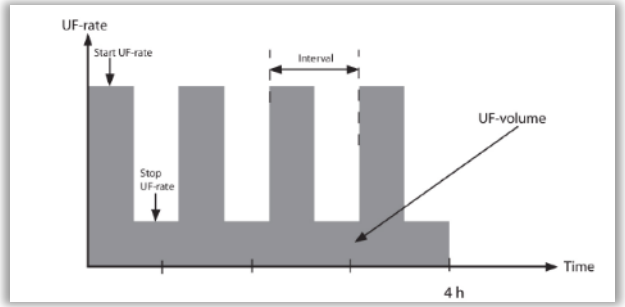
FEATURE | Profiling Ultrafiltration



With linear profiles the machine knows the set time and UF volume, the operator sets the start UF rate, and the machine will calculate a smooth decreasing profile.

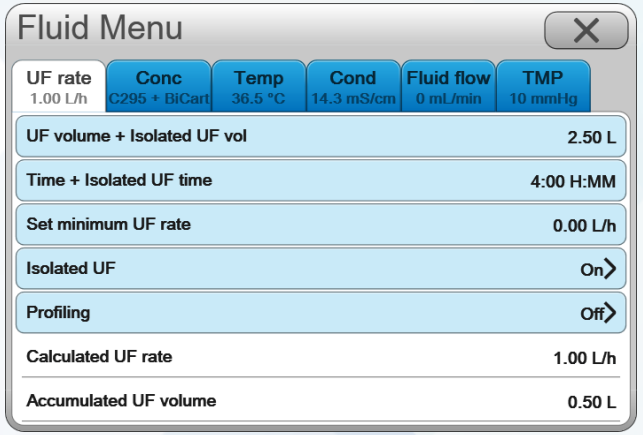


With step profiles the machine knows the set time and UF volume, the operator sets the start UF rate, and the number of steps and the machine will calculate the profile.

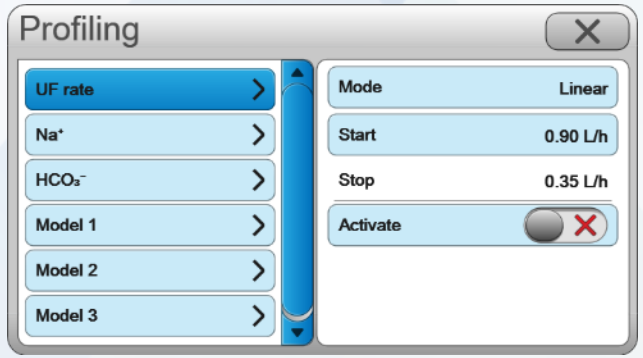


With interval profiles the machine knows the set time and UF volume, the operator sets the start UF rate, and the number of intervals and the machine will calculate the profile.

FEATURE | Profiling Settings and Activation



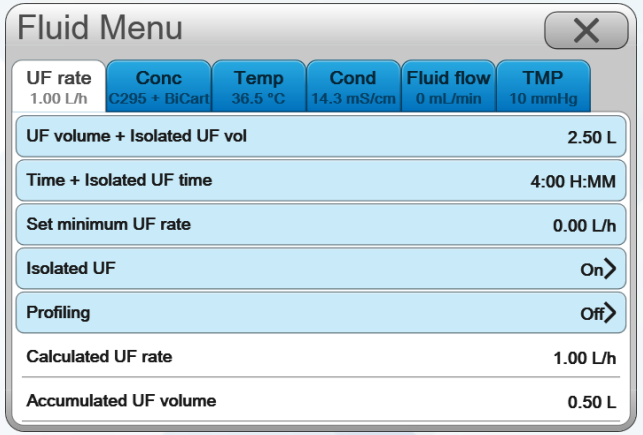
All of the **profiling settings** are reached by pressing the **fluid button** and then **profiling**, in the fluid menu.



Choose the desired mode; depending on which mode is selected, **set and OK** the other parameters. After doing so, **activate profiling**.

The **status bar** at the bottom of the screen will show which profiles are running.

FEATURE | Profiling when using a Profiling Model



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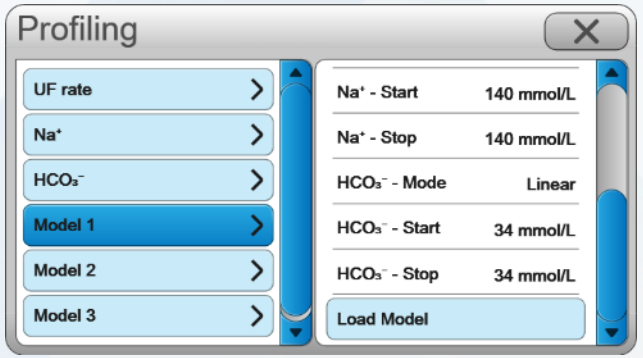
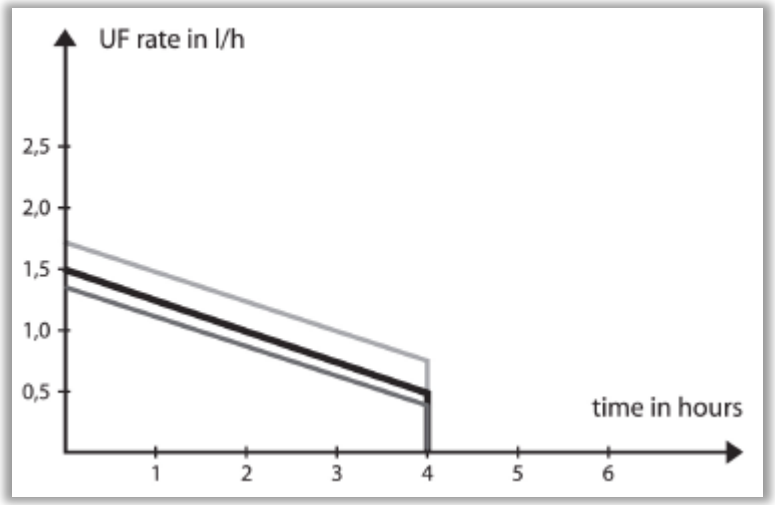


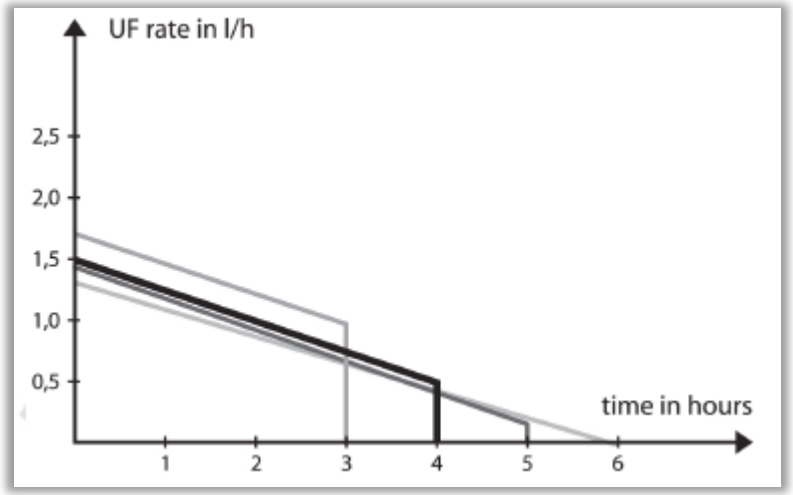
Choose the **desired preset model**, and check that the preset values are appropriate for the patient. After doing so, **activate profiling**.

FEATURE | Changes to the Ultrafiltration Profile

When running an ultrafiltration profile, any changes to the treatment time and/or the ultrafiltration volume will have an effect on the ultrafiltration rate and change the shape of the profile.



The original profile in black and changes to the UF volume in grey



The original profile in black and changes to the treatment time in grey

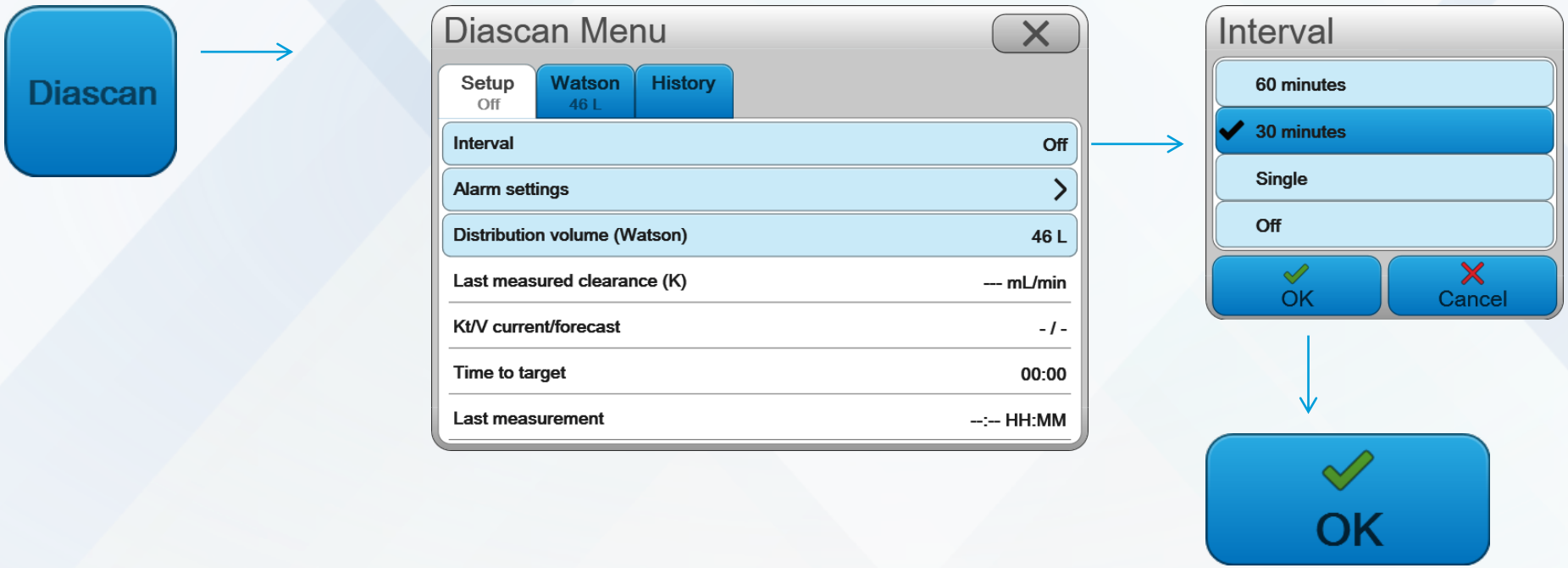
FEATURE | Diascan Monitoring System Checking K, Kt & Kt/V

The **Diascan** monitoring system measures and calculates the following parameters;

- **Clearance (K)** – How much blood has been **cleaned** per unit of time (mL/min)
- **Clearance multiplied by treatment time (Kt)** – The **volume of the blood that has been cleaned** so far in the treatment
- **Clearance multiplied by treatment time and divided by the patients fluid distribution volume (Kt/V)** – the patient's **dialysis dose**

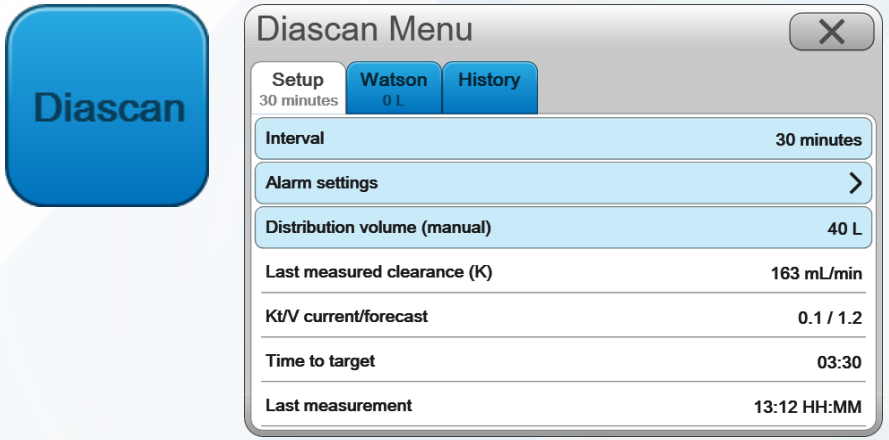
FEATURE | Diascan Monitoring System Measurement Frequency

- The **Diascan** monitoring system measurements can take place every 30 or 60 minutes, or as a single reading.
- This is done by pressing interval within the setup tab.



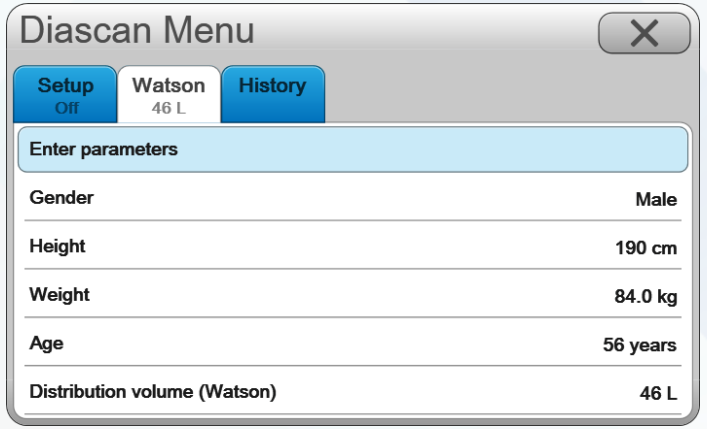
FEATURE | Diascan monitoring System Setting the V Value

To get a Kt/V reading, the **patients distribution volume** has to be entered into the machine. This can either be done in the **setup tab** if the distribution volume is known, or through the **Watson tab** if it needs to be calculated.



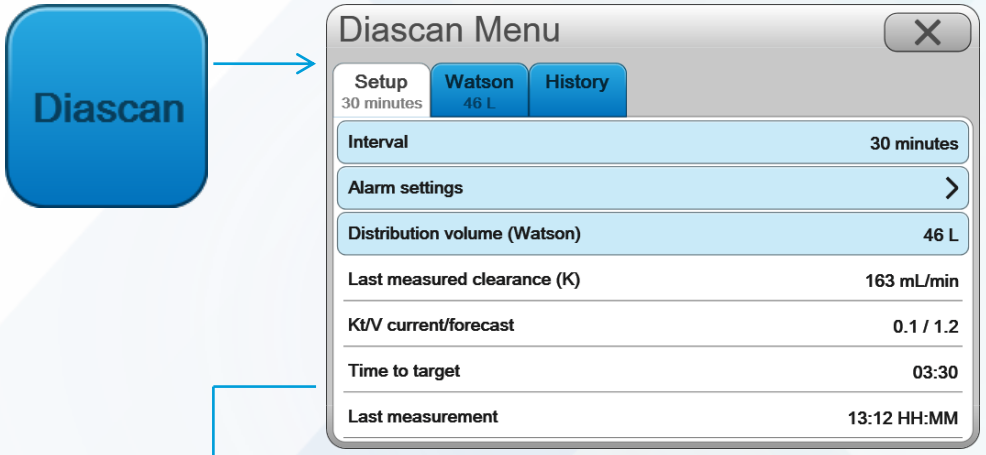
An already **calculated distribution volume** can be set manually.

Using the **Watson tab**, the patients data is set to calculate the distribution volume.



FEATURE | Diascan Monitoring System Targets & Alarms

It is possible to set both **targets and alarms** for the **Diascan** monitoring system readings.

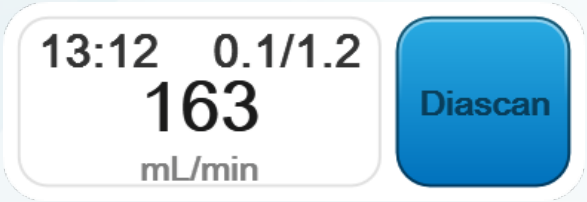


The **target Kt/V** is set here, an alarm can also be set to alert the operator if the Kt/V will be lower than desired.

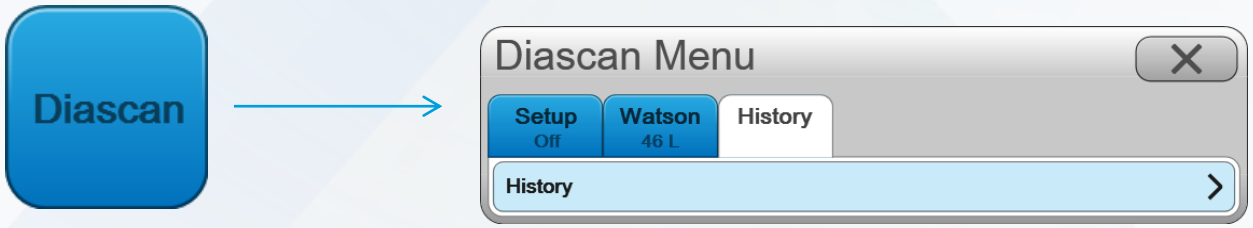
Time to target indicates how much more treatment needs to be completed to achieve the set target Kt/V. It should always be less than the remaining treatment time in order to achieve the target.

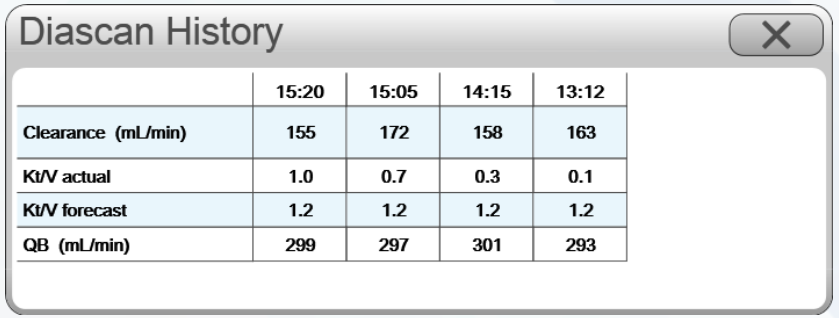
FEATURE | Diascan Monitoring System History

The clearance rate from the most recent reading of the **Diascan** monitoring system is always displayed in the clearance area, alongside the current and forecast Kt/V.



To view the previous clearance rates, Kt/V actual and forecast, and the Qb at the time of the reading, press the history tab within the **Diascan** menu.





	15:20	15:05	14:15	13:12
Clearance (mL/min)	155	172	158	163
Kt/V actual	1.0	0.7	0.3	0.1
Kt/V forecast	1.2	1.2	1.2	1.2
QB (mL/min)	299	297	301	293

Hands on

- Assisted priming
- Time 3:30, UF Vol 0,5L
- Fluid flow 700 ml/min
- Heparin:
  - Bolus 1.5 mls
  - Flow rate 1.0 ml/hr
  - Stop time 0 min
- Isolated UF:
  - 0.2 L
  - 10 minutes
- Na+ profile (deactivate after 10 minutes):
  - Start 144, Stop 136
- Diascan (start after Isolated UF and profiling are finished):
  - Interval 30 minutes
  - Watson
  - Kt/V target 1.2
  - Kt/V limit 1.0

End of Isolated UF, Profiling and Diascan module

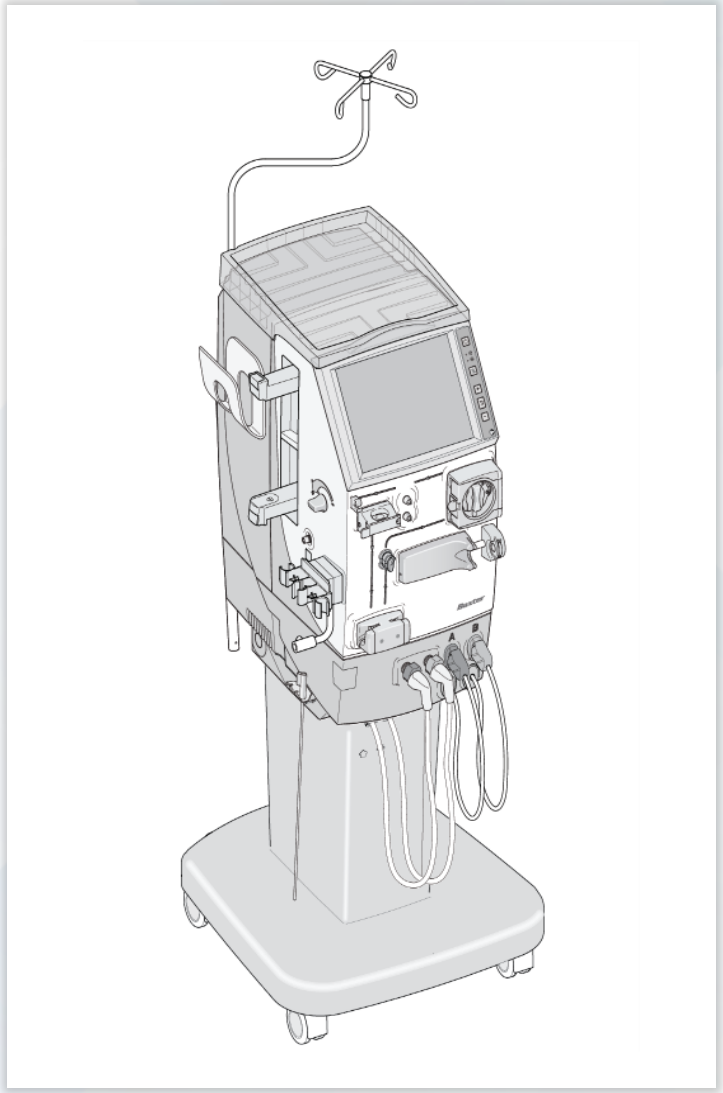
AK 98 Dialysis Machine

Troubleshooting module

Reference: **AK 98** Operator's Manual 3.xx
Chapter 3 & Alarm handbook

Baxter

AK 98 DIALYSIS MACHINE



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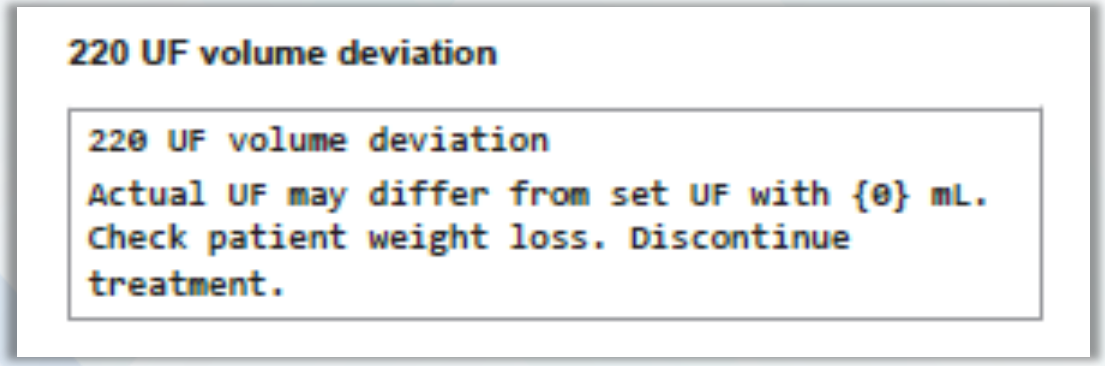
Aims & objectives

The aim of this module is to get an overview of the **AK 98** dialysis machine with special focus on:

- Troubleshooting
  - UF supervision
  - Fluid leakage
  - Halt button
  - Power failure
  - Manual rinse back
  - Air in venous drip chamber
  - Changing the **BiCart** cartridge
  - Changing the blood lines and dialyzer

MACHINE FUNCTIONALITY | UF Supervision Alarm

There is one alarm associated with the UF supervision.

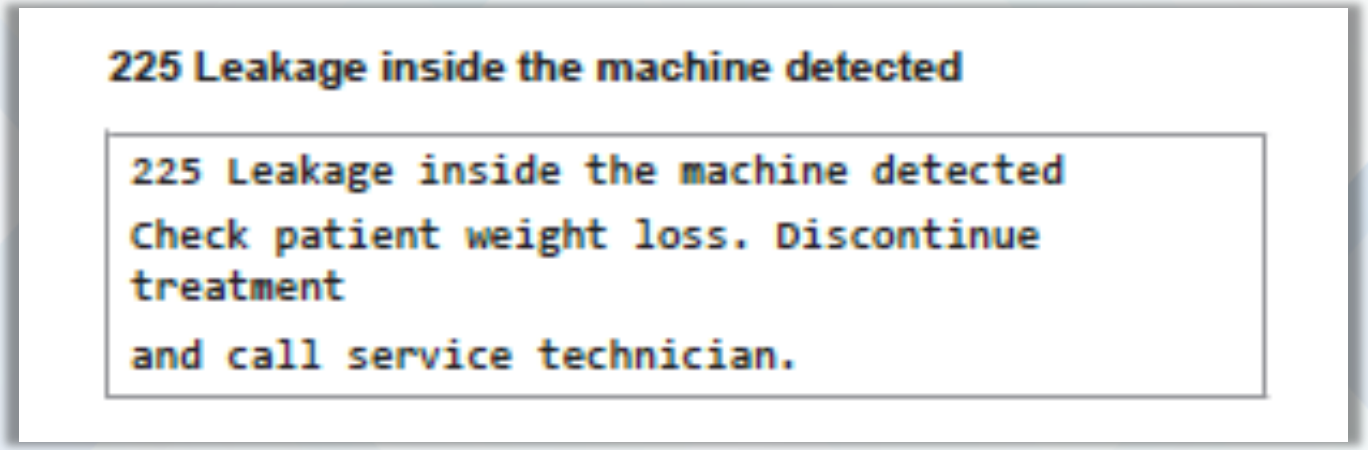


The alarm appears when the UF volume measurements are not within the specification of the machine, this can happen when:

- The UF control is not calibrated or incorrectly calibrated
- The UF control does not work correctly
- The protective system UF sensor does not work correctly

MACHINE FUNCTIONALITY | Fluid Leakage Alarm Alarm

There is one alarm associated with fluid leakage

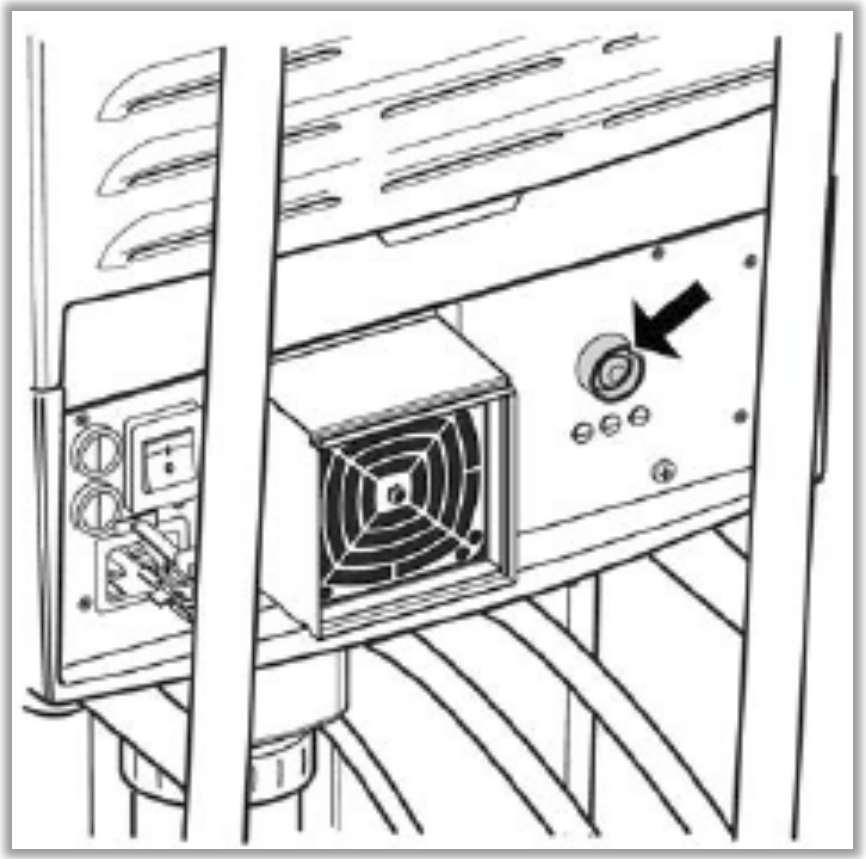


The alarm appears when the machine has detected a fluid leakage during treatment.

In case of an ultrafilter leakage, the detected volume could be an excessive UF volume

TROUBLESHOOTING | Halt Button

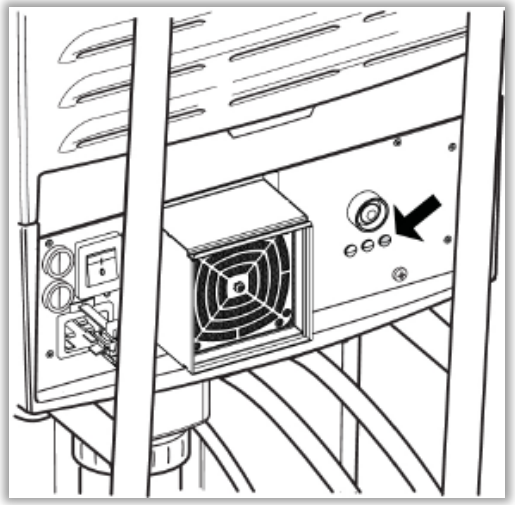
- If it is necessary to perform a **'reset'** of the machine, this can be done by pressing and holding in the halt button on the rear of the machine.
- This **interrupts the power supply** to the machine and overrides the battery back up.
- When the button is released the machine will **perform a recovery**.



TROUBLESHOOTING | Power Failure

- If there is a power failure, the machine has a battery back-up which lasts approximately 30 minutes and keeps the screen and the blood pump operational. During this time the dialysis fluid is not heated and the dialysis fluid is in bypass.
- If all the battery back-up charge is used up or, for some reason it does not work, then the machine will shut down. All the settings and the actual values will be kept.
- When the power returns, press the On/Off button to start the machine. The machine will perform a recovery and the treatment will continue from where it stopped. **However,** all the treatment parameters must be checked when starting after a recovery.

Battery connect indicator is lit green if the battery back-up has been installed



Battery charge indicator is lit yellow when the mains cable is connected to the mains supply and the main switch is switched on

TROUBLESHOOTING | Power Failure Alarms

213 Power failure

213 Power failure
Battery operated for {0} minutes.

Most common, all **AK 98** are equipped with battery back-up

Appears:

Immediately at power failure when battery back-up is operating. The displayed minutes indicate how long the power failure has lasted.

Machine actions:

Only the blood unit will run during a power failure.

122 Restarted after power failure

122 Restarted after power failure
To continue press Confirm.

In case of battery backup failure.

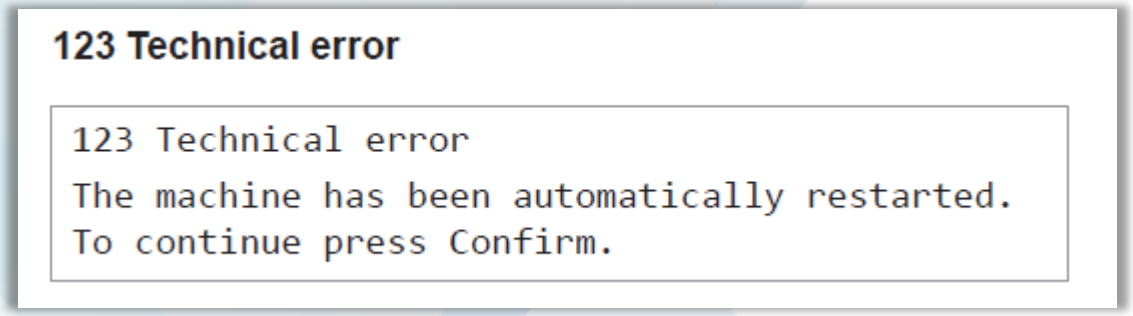
Appears:

When the machine has recovered from power failure.

Machine actions:

None.

TROUBLESHOOTING | Automatic Restart



Appears:

When there is a (specific type of) technical fault in the machine.

Machine actions:

A number of automatic restart attempts will be made. If this is unsuccessful an unconditional or conditional technical alarm will appear.

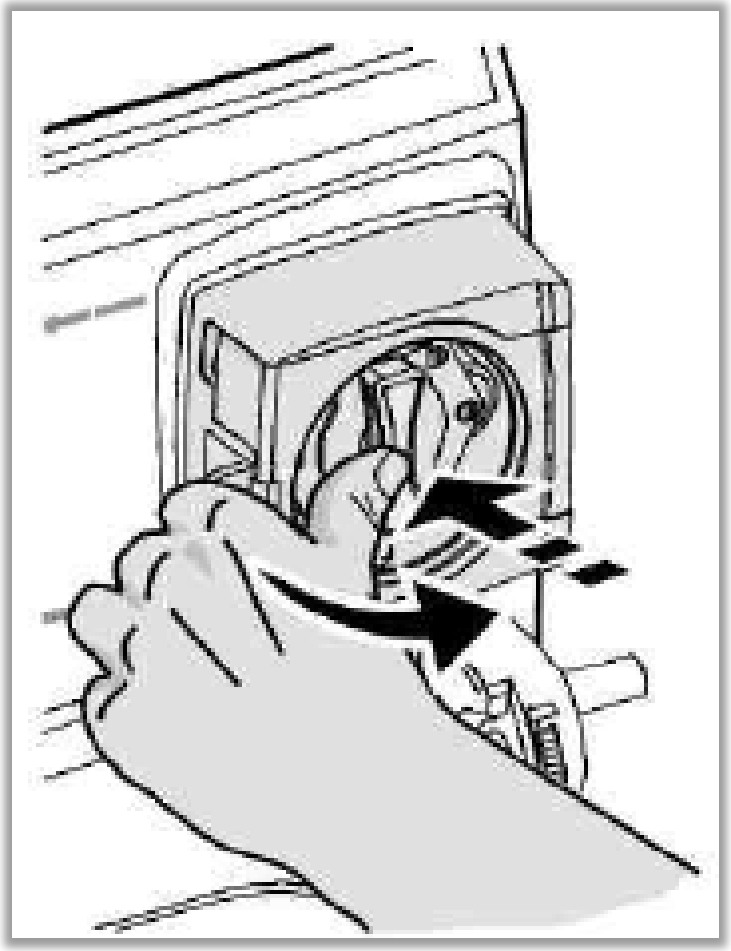
Why does an automatic restart occur?

- AK 98 is designed with a safety philosophy that involves a continuous supervision of the computers inside the machine.
- If the system identifies a problem, it will generate an automatic restart to restore a fully operational system.

TROUBLESHOOTING | Manual Rinse Back

The blood can be returned manually in the event of a power failure when no battery back-up is available.

- Connect arterial blood line to the rinse-back solution
- Open the blood pump cover
- Manually turn the blood pump anti-clockwise

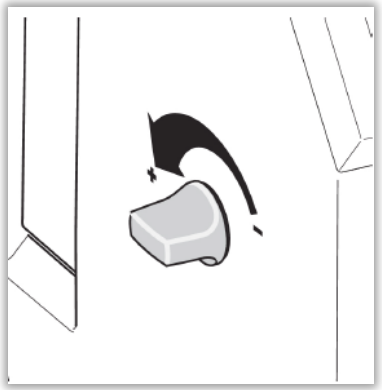


When returning the blood manually, the operator is responsible for visually observing all safety parameters that cannot be monitored by the machine during a power failure (for example air detection)

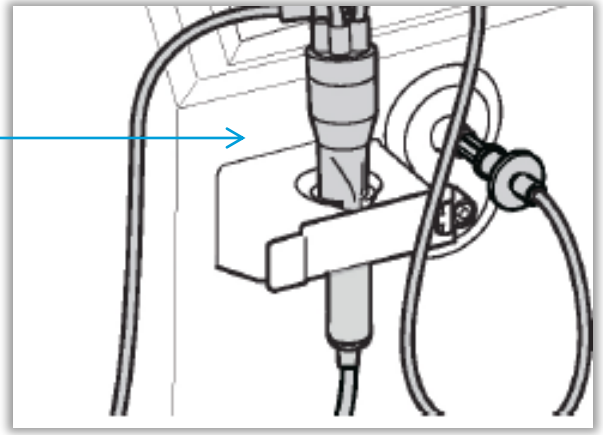
TROUBLESHOOTING | Air in Venous Drip Chamber

When the blood level in the venous chamber drops below the level of the air detector, then alarm #100 Air in venous drip chamber is triggered.

- Check the blood circuit connections are tight.
- Use the timer or confirm icon in the alarm message to restart the blood pump, at the same time increase the blood level in the venous chamber using the level adjustment knob.

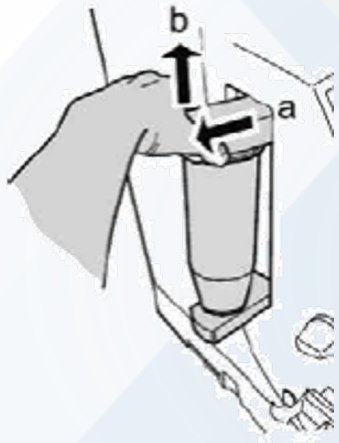


Recommended blood level

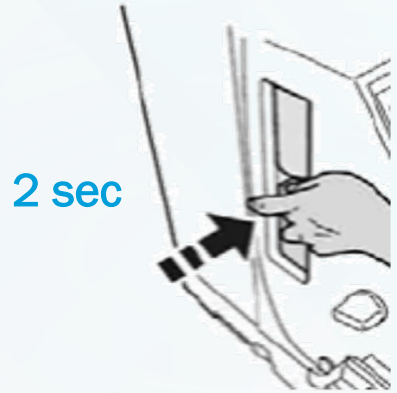


TROUBLESHOOTING | Changing the BiCart Cartridge

If the **BiCart** cartridge needs to be changed during the treatment, follow these steps;



Remove the empty **BiCart** cartridge

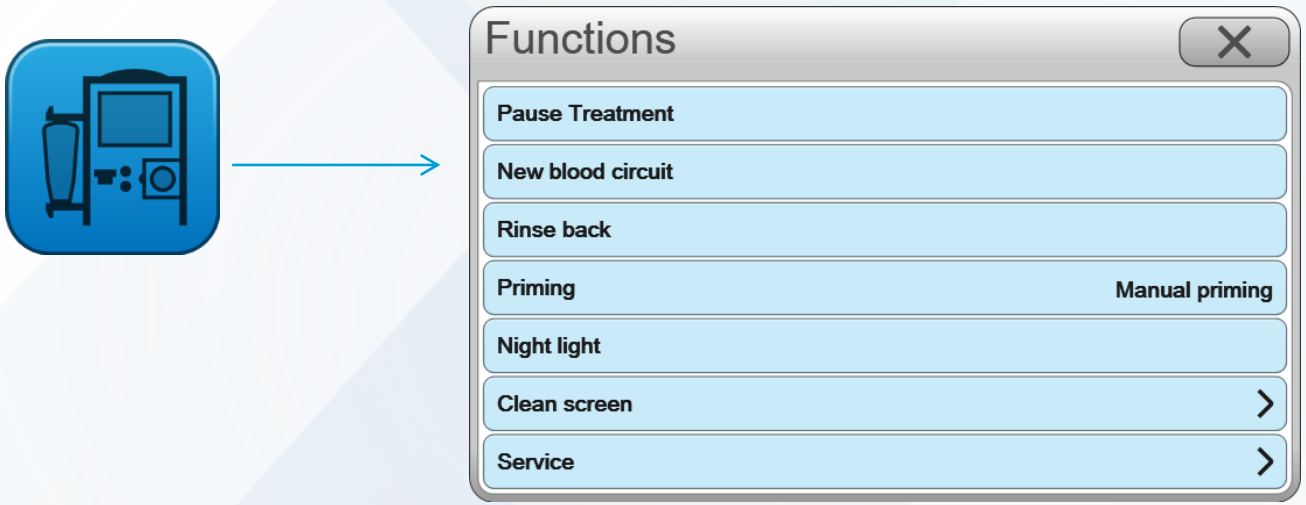


Close the latches and wait for 2 seconds

Attach the new **BiCart** cartridge

Trouble shooting | Changing the dialyzer & blood lines

If the dialyzer and the blood lines need to be replaced during the treatment this can be done by pressing the functions button.



- Within new blood circuit there are two options; rinse back if this is possible, or new blood circuit if it is not possible or desired to rinse back.
- The dialyzer fluid tubes are returned to the machine, and then the blood lines can be removed. New blood lines and dialyzer are mounted. The new circuit is then primed and then the patient can be reconnected.

Hands on

- Resolve an air in venous drip chamber alarm
- Change the BiCart cartridge
- Change the blood lines and the dialyzer and continue the treatment
- End the treatment
- Simulate a power failure and rinse back the blood manually

End of troubleshooting module

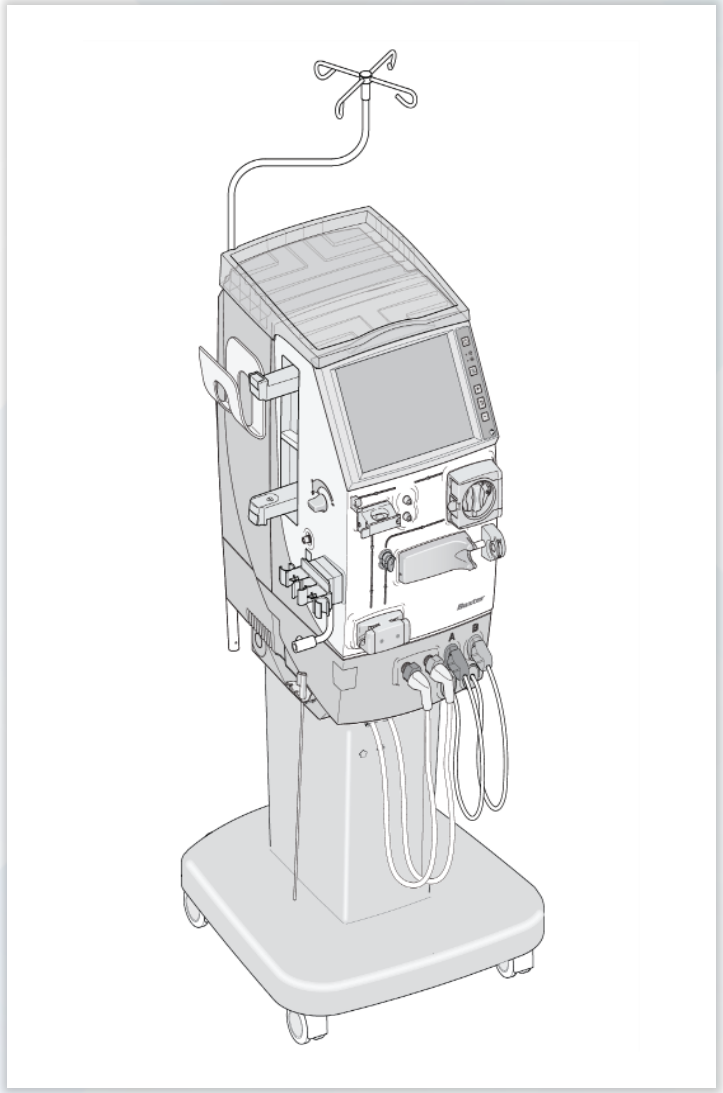
AK 98 Dialysis Machine

Single needle module

Reference: **AK 98** Operator's Manual 3.xx
Chapter 5

Baxter

AK 98 DIALYSIS MACHINE



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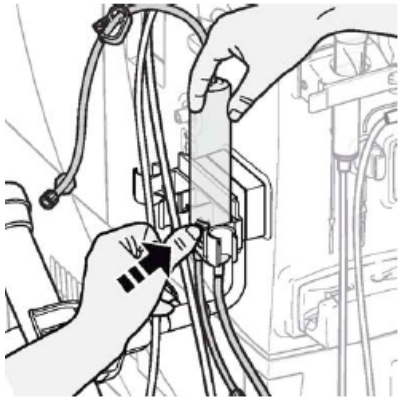
LEARNING OBJECTIVES

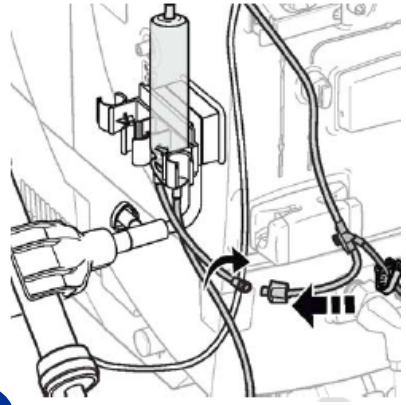
The aim of this module is to get an overview of the **AK 98** dialysis machine with special focus on:

- Single needle
  - Lining and priming
  - Terminology
  - Activation
  - Start the treatment
  - End the treatment

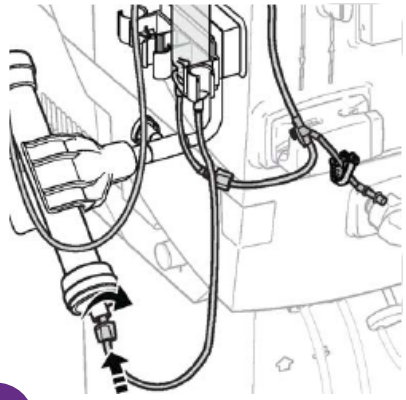
SINGLE NEEDLE | Lining & Priming the Machine



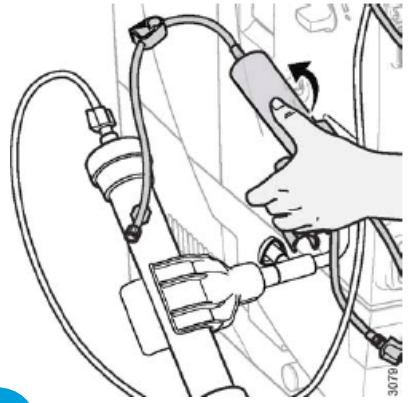
1 Push the venous expansion chamber, into the expansion chamber holder, until it ‘clicks’ into position.



2 Attach the venous dialyzer line to the expansion chamber blood line.



3 Attach the expansion chamber dialyzer line to the dialyzer.



4 Tilt the expansion chamber holder backwards until it ‘clicks’ into position.

SINGLE NEEDLE | Terminology

In single needle the patient's blood is removed from, and returned to, the single access point in a cycle with two phases;

- **The Arterial phase.** The venous blood line is clamped, and blood is withdrawn from the patient into the arterial blood line. The pressure and volume in the circuit increases.
- **The Venous phase.** The arterial blood line is clamped, and the blood that entered in the arterial phase is returned to the patient via pressure and gravity.

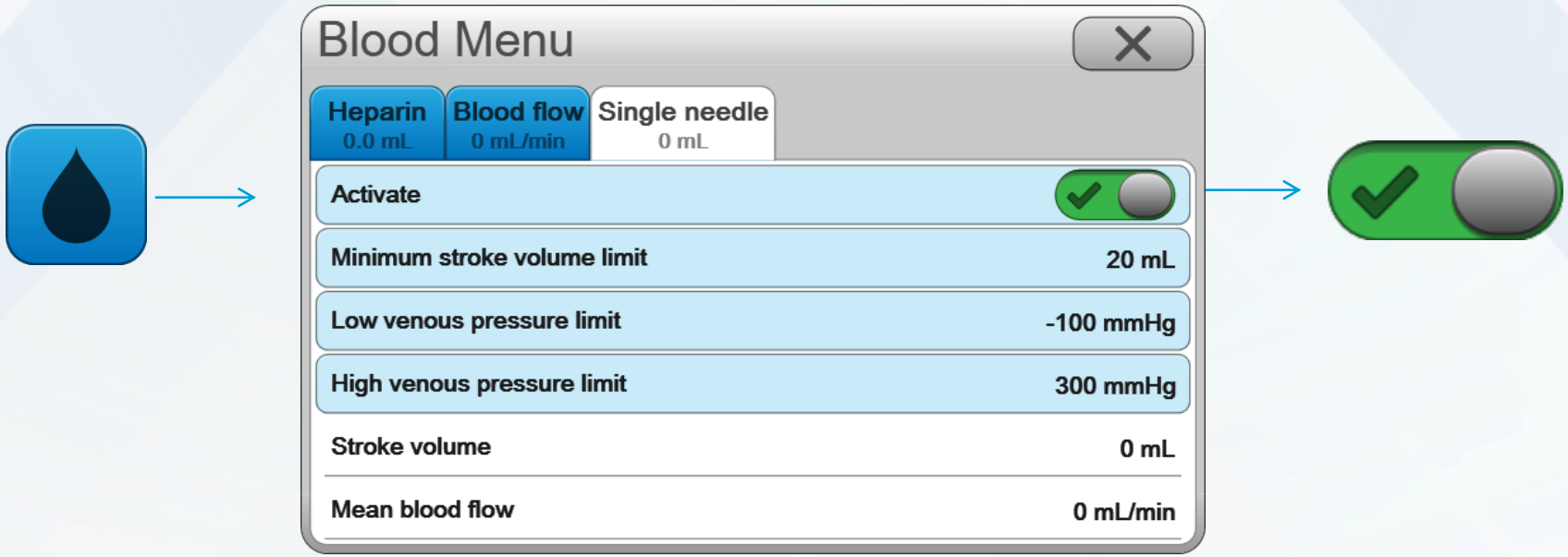
Single needle parameters;

- **Mean blood flow.** Is the effective mean blood flow rate during the complete cycle.
- **Stroke volume.** Is the blood volume which passes through the dialyzer during a cycle. The higher the stroke volume the more efficient the treatment.

SINGLE NEEDLE | Activation

- After priming is completed, check the priming fluid level in the expansion chamber is around the groove and return it to the upright position.

- Press the blood button and open the blood menu. Press the single needle tab and set a minimum stroke volume limit, and then activate single needle. The machine is now ready for patient connection.



SINGLE NEEDLE | Start the Treatment

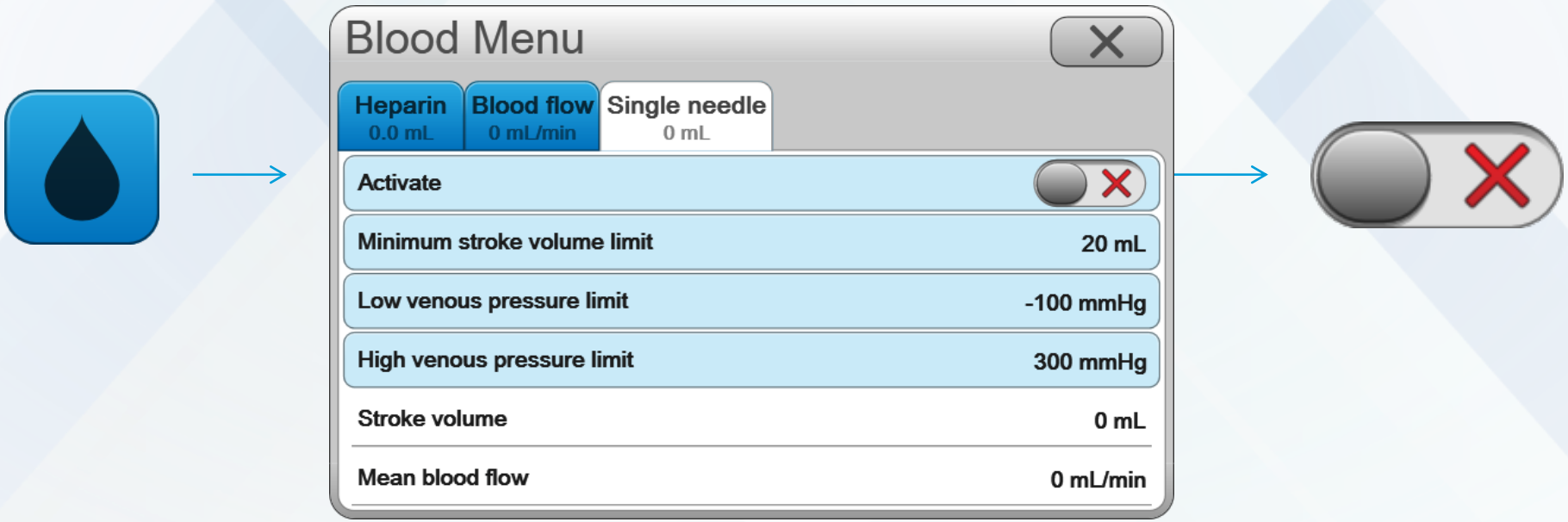
- Once the treatment has been started, press the flashing arterial pressure control to centralize the alarm limits around the current value.

- The alarm limits for the venous pressure are automatically set once the treatment has started to +350mmHg (high limit) and +150mmHg (low limit). If it is necessary to change the limits, press the venous pressure control. Alternately the limits can also be changed by in the blood menu low and/or high venous pressure limit.

- The stroke volume that can be achieved is determined by the size and position of the venous pressure alarm window, and the potential expansion volume provided by the expansion chamber.

SINGLE NEEDLE | End the Treatment

At the treatment end before rinseback, deactivate single needle and proceed according to earlier end the treatment and rinse back instructions .



Hands on

- Line and prime the machine
- Connect the patient
- Activate single needle
- Optimize the stroke volume
- End the treatment
- Deactivate single needle
- Rinse back

End of Single Needle module

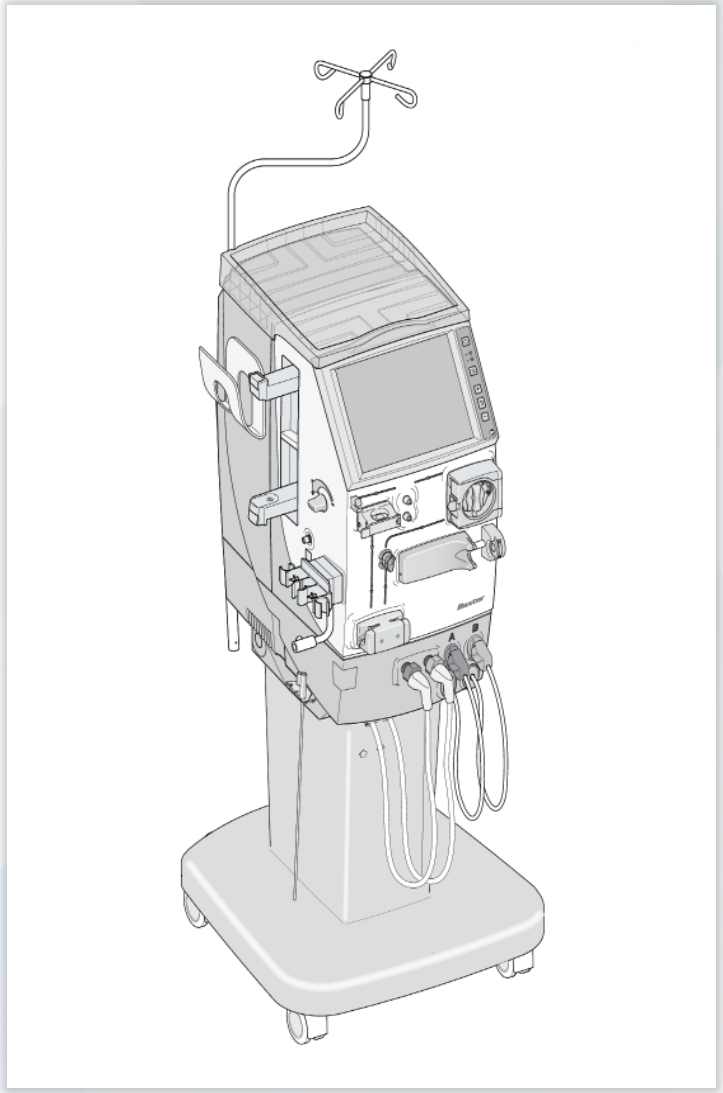
AK 98 Dialysis Machine

Hygienic maintenance module

Reference: **AK 98** Operator's Manual 3.xx
Chapters 10 & 11

Baxter

AK 98 DIALYSIS MACHINE



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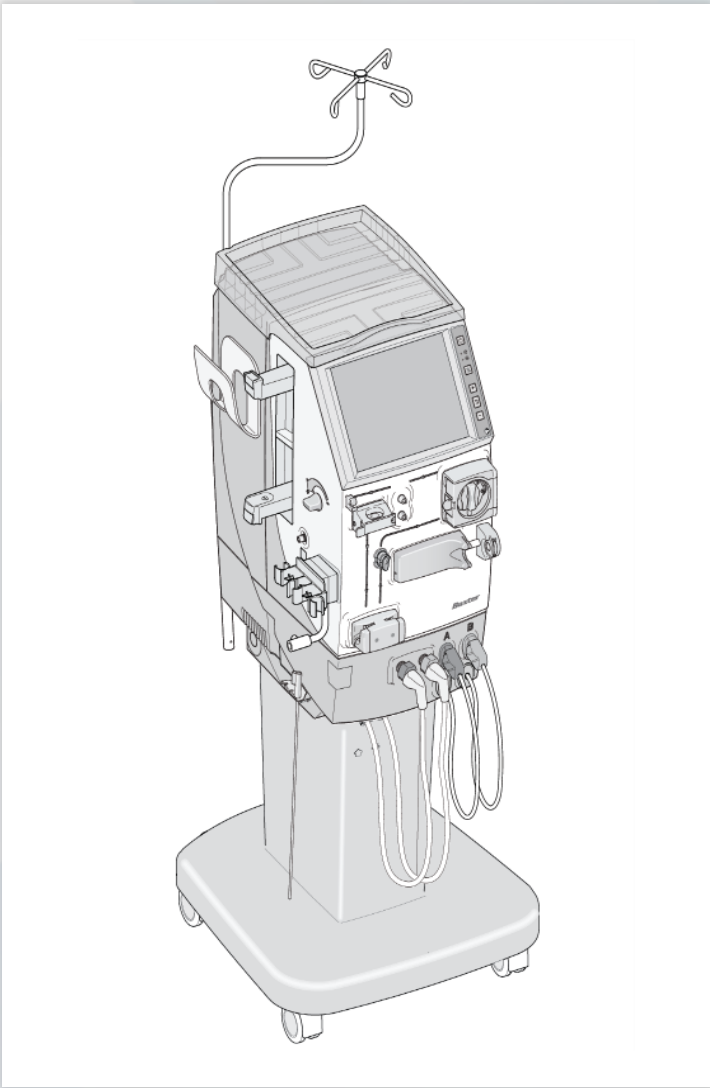
LEARNING OBJECTIVES

The aim of this module is to get an overview of the **AK 98** dialysis machine with special focus on:

- Hygienic maintenance
  - Exterior cleaning
  - Heat disinfection
  - Heat citric disinfection
  - Descaling
  - Chemical disinfection
  - Integrated Heat disinfection
  - Ultrafilter change

HYGIENIC MAINTENANCE | External Components



- After each dialysis treatment, the machine exterior surfaces must be disinfected.
- Using a cloth moistened with either ethanol 70%, isopropanol 60% or 1% hypochlorite, wipe all of the machines exterior surfaces and the top tray.
- In case of cleaning with hypochlorite, wipe afterwards with water.
- The pick-up tubes need to be flushed inside and out with water between each treatment, and then returned to the holder to dry naturally. Once a week, repeat exactly the same procedure using ethanol 70% instead of water.

HYGIENIC MAINTENANCE | Programs

There are different programs for cleaning and disinfecting the machine:

- Heat
- Chemical
- Rinse

HYGIENIC MAINTENANCE | Operating Conditions

NOTE!

Higher concentrations of Calcium and Bicarbonate and/or lower concentrations of acetic/citric acid in the dialysis fluid as well as higher dialysis fluid flows, and/or longer dialysis times, may require more frequent decalcification than needed for the operating conditions shown in the table below

Table 10-2. Operating conditions

Dialysis time	4 h
Dialysis fluid flow	300-800 mL/min
Dialysis fluid Bicarbonate value (HCO_3^-)	34 mmol/L
Dialysis fluid Calcium value (Ca^{2+})	1.5 mmol/L
Dialysis fluid Sodium value (Na^+)	140 mmol/L
Bicarbonate concentrate	BICART cartridge
Acetic acid or citric acid based A-concentrate	Acetate (3 mmol/L) or citrate (1 mmol/L)
Dialysis fluid temperature	37 °C

HYGIENIC MAINTENANCE I Cleaning, decalcification and disinfection schedule*

Frequency	Activity	Result
After each treatment	1. Wipe the outside of the dialysis machine with 70% ethanol or 60% isopropanol or1% sodium hypochlorite. In case of cleaning with hypochlorite, wipe afterwards with water. 2. Rinse the outside and flush the inside of the pick-up tubes with water. Let them dry naturally. 3. If the prime bucket is used, wipe the inside and outside with maximum 10% sodium hypochlorite.	Exterior cleaning
After each treatment, or at least once per day	Run a disinfection program	Disinfection
After each treatment, if no disinfection program is run	Run a descaling program	Descaling
At least after every 3rd treatment or at high usage of the equipment at least once per day	Run a heat disinfection program together with **CleanCart C*** cartridge or a heat disinfection program with liquid citric acid	Decalcification Disinfection
At least once every 7th treatment day	Cleaning using **CleanCart A*** 1. Run a heat **CleanCart A*** program 2. Run a heat **CleanCart C*** program or a heat disinfection program with liquid citric acid 3. Rinse the outside and flush the inside of the pick-up tubes with water. Let them dry naturally. Cleaning using sodium hypochlorite 1. Run a heat **CleanCart C*** or a heat disinfection program with liquid citric acid 2. Run a chemical disinfection with sodium hypochlorite 3. Wipe the outside and flush the inside of the pick-up tubes with 70 % ethanol. Let them dry naturally	Cleaning Decalcification Disinfection

*Not available in all markets

HYGIENIC MAINTENANCE I Cleaning, decalcification and disinfection schedule

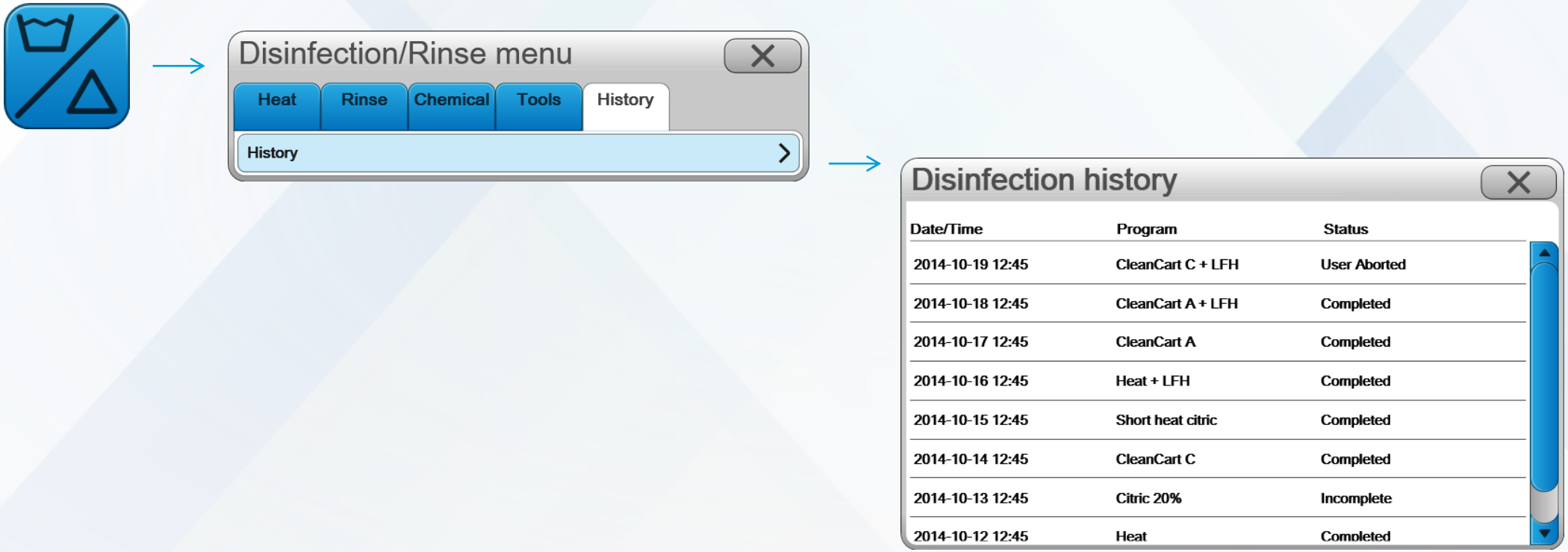
Frequency	Activity	Result
When more than 7 days passed since last disinfection	Run a disinfection program before treatment	Disinfection
Every 1-3 months	1. Change the ultrafilter 2. Run a disinfection program	Disinfection

- Do not perform more than 12 sodium hypochlorite based disinfections during the life cycle of the U9000 Ultrafilter.
- Do not perform more than 8 sodium carbonate, e.g. **CleanCart A*** cartridge based disinfections during the life cycle of the U9000 Ultrafilter.
- Disinfection using sodium carbonate e.g. **CleanCart A*** cartridge, should not be performed before periods when the machine is inactive, e.g. storage over weekend.
- The recommended process of heat disinfection using **CleanCart A*** cartridge should be followed by a heat disinfection using **CleanCart C*** cartridge the same (working) day and should preferably be performed in the middle of the working week.

*Not available in all markets

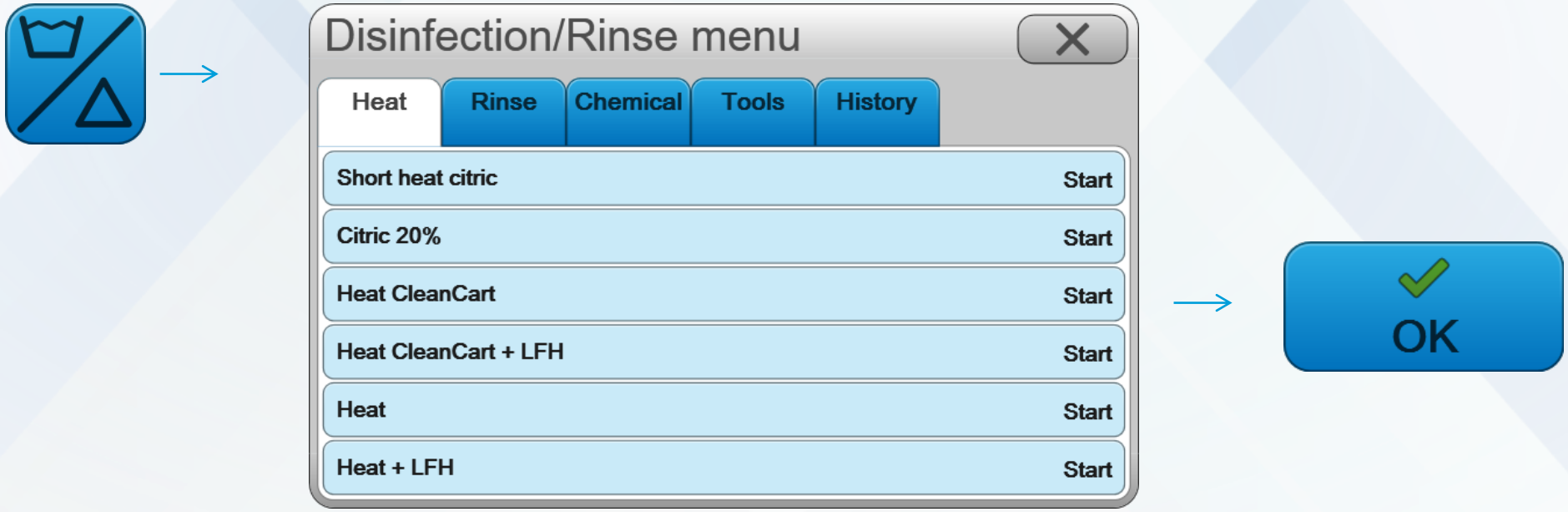
HYGIENIC MAINTENANCE | Disinfection History

- To view the disinfection history of the machine, press the disinfection button.
- Within the disinfection/rinse menu press the history tab. This will open the list where the details of the previous disinfection processes can be found.



HYGIENIC MAINTENANCE | Heat with CleanCart* Cartridge

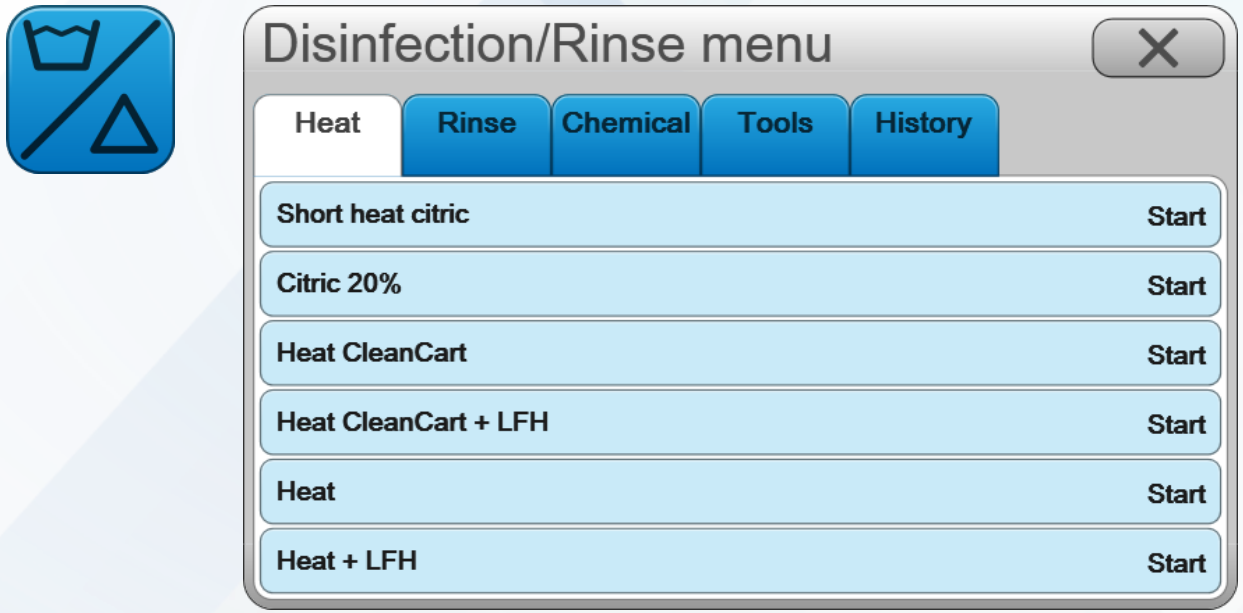
- To run a **CleanCart** cartridge disinfection program, press the **disinfection button**.
- Under the heat tab press **heat CleanCart** to start the process.
- Wait for the **attention message** to appear before inserting the **CleanCart** cartridge into the **BiCart** cartridge holder.

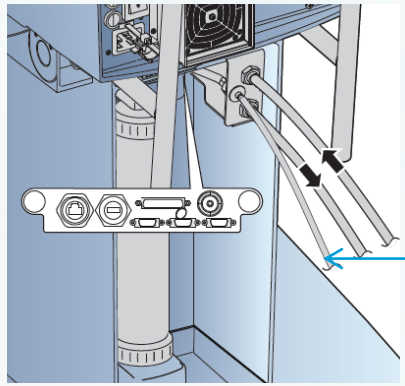


* Not available on all markets

HYGIENIC MAINTENANCE | Heat Disinfection with Liquid Citric Acid

- It is possible to run either a **short or a longer heat disinfection** with liquid citric acid.
- The citric acid concentration to be used is **configurable** and in the example below, preset to 20%.
- The **citric acid inlet tube** on the rear of the machine must be placed into the disinfectant solution.





Citric acid inlet tube

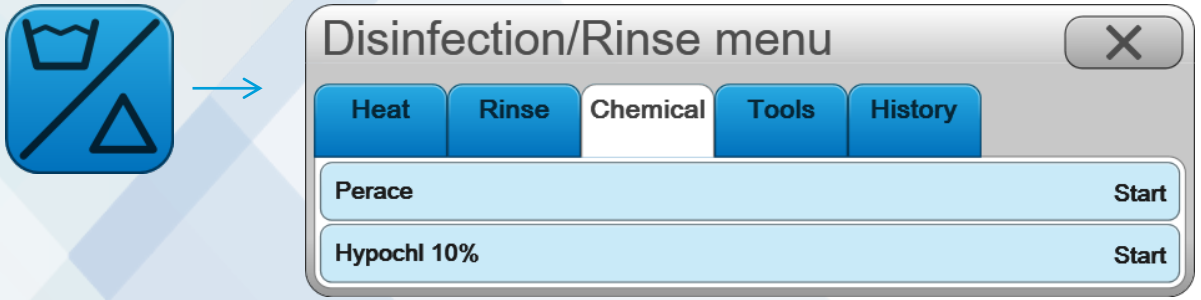
HYGIENIC MAINTENANCE | Descaling

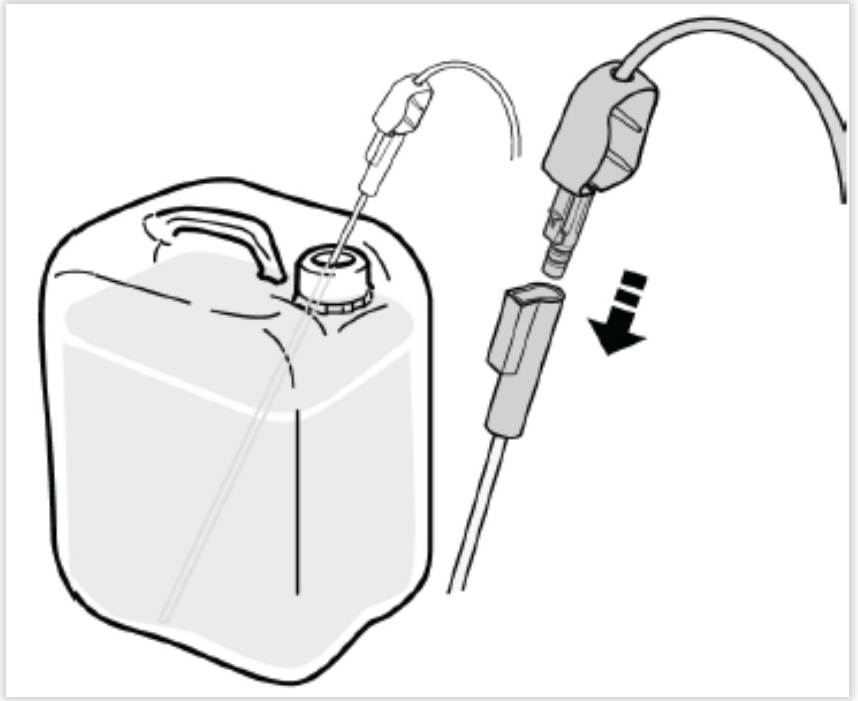
It is possible to initiate a descaling between treatments in order to remove precipitated material:

1. Selecting Descaling
2. Confirm and follow the instructions on the screen

HYGIENIC MAINTENANCE | Chemical Disinfection

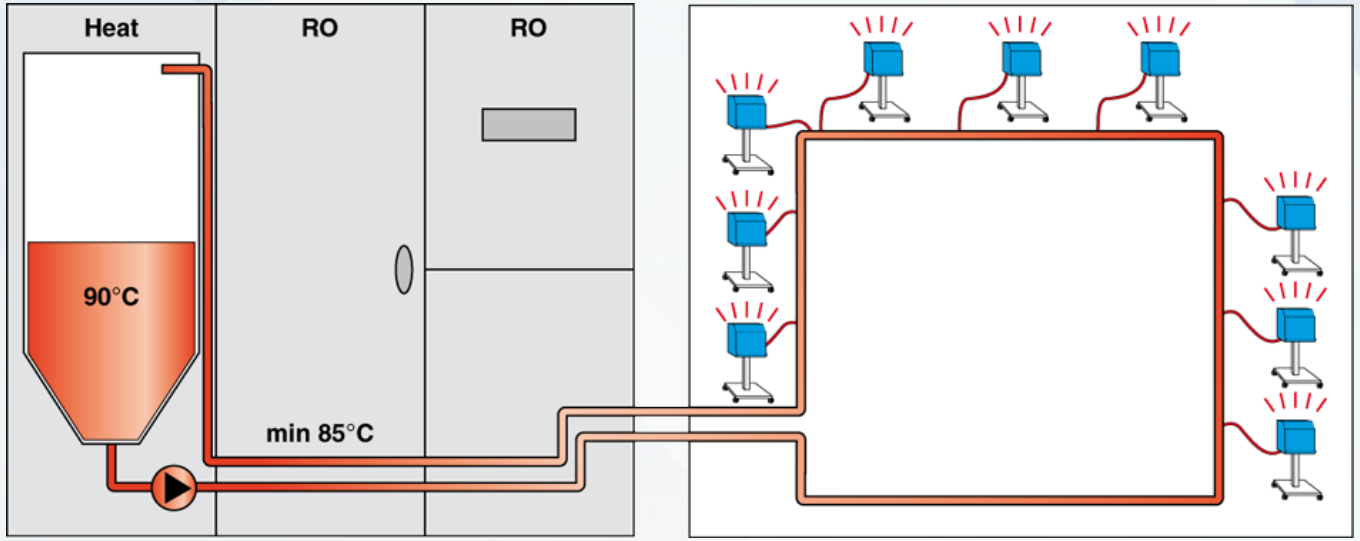
- To perform a chemical disinfection, press the **disinfection button** and then the **chemical tab**.
- Chemical disinfections must take place from the front of the machine.
- Connect the **blue** concentrate connector to the **yellow** pick-up tube.





HYGIENIC MAINTENANCE | Integration CWP*

- The machine can perform a heat disinfection that is **integrated with the central water plant (CWP).**
- During this integrated heat disinfection, the machine automatically switches on, and receives hot water from the CWP, it can also be switched on manually if required.
- The integration between the machine and the CWP allows the water inlet tube to be included into the disinfection process.



*Not available on all markets

HYGIENIC MAINTENANCE | Integration WRO 300 H Unit*

- It is possible to perform an integrated heat disinfection between the machine and the WRO 300 H unit.

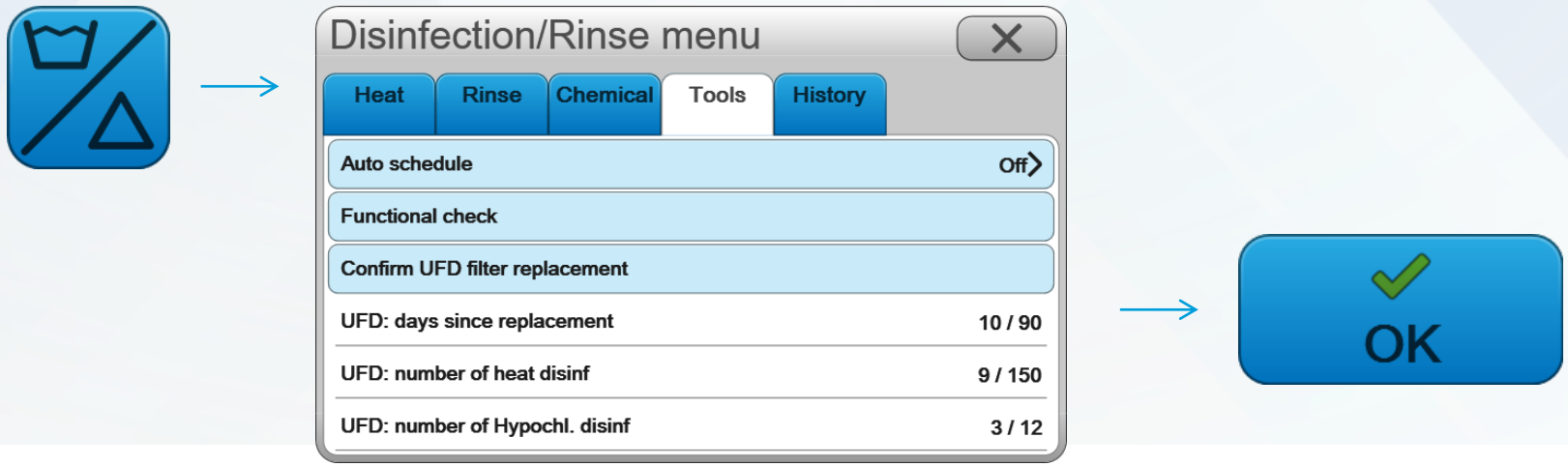
- The integrated heat disinfection procedure includes the following phases when preset by the service technician:

  - Heat disinfection of the **AK 98** dialysis machine
  - Low flow heat (LFH), where all the wet parts of the system between the machine and the **WRO 300 H** unit are exposed to hot water at a low flow rate
  - Heat disinfection of the **WRO 300 H** unit

*Not available on all markets

HYGIENIC MAINTENANCE | Changing the Ultrafilter

1. Pull the latch and press downwards
2. Pull the ultrafilter gently downwards and remove it
3. Label the new ultrafilter with the actual date
4. Lubricate the ultrafilter connections with RO water
5. Insert the new ultrafilter into the holder and push it gently upwards
6. Push the lower latch into position and close the holder until a ‘click’ is heard
7. Press the disinfection button, under the tools tab and confirm the UFD filter replacement.
8. After changing the ultrafilter, a heat disinfection must be performed before a new treatment.



Hands on

- Set an auto schedule for heat disinfections
- Perform a heat with a CleanCart cartridge
- Change the U9000 ultrafilter

End of hygienic maintenance module