Single-Needle Cross-Over System

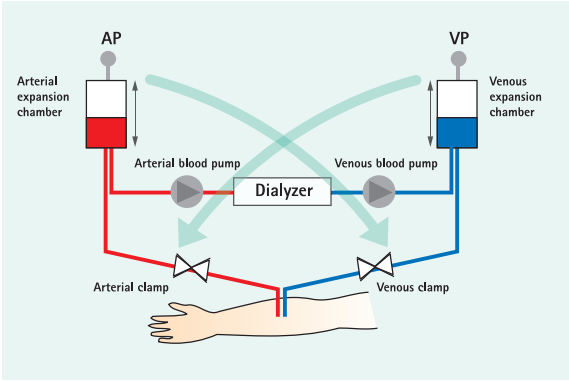
Brief description

B BRAUN
SHARING EXPERTISE

Introduction

Brief description of the Single-Needle Cross-Over system from B. Braun

- Unique pressure-pressure controlled SN process
- Constant blood flow as a result of simultaneously operating pumps
- Virtually constant pressure in the dialyzer
- Minimum recirculation
- Low impact on shunt as a result of indirect blood transport
- More than 15 years of market experience



The Single-Needle Cross-Over (SN-CO) name is derived from the control's special feature: When reaching a certain control pressure, the opposite tube clamp closes and the respective other phase begins. Hence, the clamps' control is carried out crosswise: Cross-Over.

Function description

We distinguish between the **arterial** and **venous** phases:

Arterial phase

- The arterial clamp is open, the venous clamp is closed.
- Blood flows from the patient into the arterial expansion chamber and then on through the dialyzer into the venous expansion chamber.
- Blood collects in the venous expansion chamber as the venous tube clamp is closed; the venous pressure rises.
- When a certain venous control pressure is reached, the clamps are switched: the arterial clamp is closed and the venous clamp is opened.
- The venous phase begins.

Venous phase

- The venous pressure falls again.
- Blood is released from the arterial expansion chamber and flows through the dialyzer into the venous expansion chamber and back to the patient.
- As the arterial clamp is closed, the arterial pressure falls.
  When a certain arterial control pressure is reached, the clamps are switched: the venous clamp is closed and the arterial clamp is opened.
  The arterial pressure rises again.
- A new arterial phase begins.

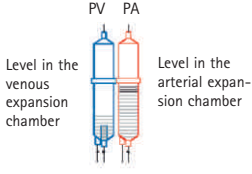
Function description

Setup

- Insert the arterial and venous tube system:
  - Feed the lines leading to the patient through the corresponding clamps.
  - Do not yet insert the tube segment into the second (venous) blood pump. Ensure that the second pump segment is above the pump.
  - Connect the PBS pressure sensor and the other pressure sensors.

The PBS pressure sensor should always be connected prior to the blood-side self test. If the pressure sensor needs to be connected following the start of treatment, the PBS values displayed must be confirmed.

Fill



Set the saline level in the arterial and venous chambers as shown.

Enter patient's parameters as usual.

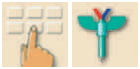
Handling

Connect patient

Switch to treatment mode via the **Connect patient** icon. Confirm patient data!

■ Start the blood pump, fill the system with blood and finally connect the venous line to the patient.

Device settings



Touch the **Parameter** icon and the **SN** icon.

Select **SN-CO**.

The pre-set limit values for the arterial and venous control pressures set themselves automatically.

Recommendations for the control pressures

Optimum control pressures:	Arterial mmHg	Venous mmHg
Central catheter/ Good fistula	up to -200	360 to 390
Delicate fistula	up to -150	300
Initial punctures	-120 to -150	250 to 300

■ Insert the second pump segment into the venous pump. Start the blood pump.

Handling

Recommendation for the blood pump speed

- When connecting to a fistula, start the blood pump with 100 – 120 ml/min and increase slowly. Final speed depending on the condition of the blood vessel.
- When connecting a central venous catheter, start with 150 ml/min, increase slowly. Final speed 200 - 300 ml/min.
- Target value for phase volume appr. 30 – 35 ml.

Checking the phase volume, the blood flow and the pressure values.

You also have the option to select SN-CO even **before** connecting the patient.

End

- During end of therapy leave the second pump segment in the venous blood pump.

Alarms and warnings

Pressures

Monitoring the pressures in the blood vessels is carried out using a time window. Reaching the pressure compensation in the expansion chambers must take place within a specific time; the system will otherwise trigger an alarm. To this end, the blood pump speed has an influence on the time window.

"Arterial pressure lower limit"

Does the patient's blood access offer **insufficient conditions**?

- Check the blood lines (kink?).
- Reduce blood pump speed.
- Possibly measure the blood pressure / change patient's position.

If the measures do not result in the desired effect, a **mechanical blockade** (i.e. suction of the cannula / of the catheter) may be the cause.

- Increase the arterial control pressure toward zero (e.g. from -180 to -150 mmHg) to reduce the suction on the tip of the cannula / catheter.
- Check, and if necessary, correct the position of the cannula / catheter.
- Monitor the phase volume.
- If the phase volume increases, increase the blood pump speed step-by-step again.

"Venous pressure upper limit"

- Reduce blood flow.
- Check the position of the patient / the catheter / the cannula.
- If necessary, reduce the venous control pressure.

Alarms and warnings

Phase volume

Monitoring the phase volume is carried out using relative and absolute limit values. A warning highlighted in yellow appears on reaching the relative limit values. The limit values can be readjusted by activating the blood pump (1x +, 1x -). Reaching an absolute limit value triggers an alarm (red).

"Phase volume too low"

- **Reduce** blood flow and, if necessary, **extend** control pressures.
- If necessary, correct the cannula / catheter position.

"Phase volume too high"

- **Important:** check the tube system connections for air intake!
- Check whether the arterial patient line is inserted in the arterial clamp.
- **Increase** blood flow and, if necessary, **decrease** control pressures.

Additional alarms "PBS too high" / "PBS too low"

- Short-term change of the blood flow.
- If necessary, end single-needle mode.
- If necessary, contact the technical service.

FAQs

How does the blood transport work?

The system autonomously adapts to the pressure and flow conditions in the blood vessel. The blood transport is carried out exclusively by pressure compensation in the **expansion chambers**. This is the result of the generated underpressures (arterial) or overpressures (venous) caused by the closed clamps. This ensures that the blood is **not** directly transported from the blood vessel, hence correspondingly relieving the shunt.

What function does the PBS carry out?

The PBS controls the venous blood pump by monitoring the pressure. This prevents pressure fluctuations in the dialyzer, permitting virtually constant TMP. The pressure sensor measures the pressure at the dialyzer outlet and sets the blood pump speed – taking the ultrafiltration into account – so that there is no pressure drop at the dialyzer membrane. This means that, depending on the ultrafiltration volume, the venous blood pump runs more slowly than the arterial blood pump and hence counteracts a pressure drop in the dialyzer.

What effect do the control pressures have?

- Upon reaching the set control pressures, the clamps are opened or closed. Here, the arterial control pressure closes the venous clamp and vice-versa.
- IMPORTANT: the pressure value displayed does not – as in double-needle mode – show the pressure conditions in the blood vessel, it shows the control pressure.

FAQs

What is the phase volume and what value should it reach?

The phase volume is the volume that is transported into the expansion chambers per cycle. To achieve sufficient dialysis efficiency, the volume should reach at least 30 ml. The phase volume sets itself automatically, but is dependent of

- the blood flow / blood pump stop
- the control pressures
- the height of the levels in the chambers
- pressure changes in the shunt.

What are the benefits of the system?

- As both pumps operate at the same time, a constant flow is achieved in the dialyzer and pressure fluctuations are extensively avoided.
- The shunt is relieved as a result of indirect pressure compensation.
- Minimisation of the tube system compliance as a result of the arterial and venous clamps and hence extremely low recirculation.
- Generally a higher cumulated blood volume than in the case of other systems.

Notes

These brief instructions are not a substitute
for reading the detailed instructions

B. Braun Avitum AG | Schwarzenberger Weg 73-79 | 34212 Melsungen | Germany
Tel. +49 5661 71-2624 | Fax +49 5661 75-2624 | dialysis@bbraun.com | www.bbraun-dialysis.com

W. 01.02.10/1 No. 708 0140A Edition: 02/2010