

CDI[®] Blood Parameter Monitoring System 550

Real-time monitoring of DO₂ as one of 12 key blood parameters



CDI® Blood Parameter Monitoring System 550

The standard in the industry for continuous in-line blood parameter monitoring

With the addition of in-line monitoring of oxygen delivery (DO₂), CDI System 550 provides the continuous information needed to reduce the risk of acute kidney injury, improve patient outcomes and save hospital costs.^{1,2}

Real-time monitoring of DO₂, one of 12 key blood parameters, provides critical information required for goal directed perfusion, helping to achieve optimal perfusion during cardiopulmonary bypass surgery.

User selectable limits provide alerts when values are approaching critical DO₂ thresholds.

CDI System 550 offers a full range of next-generation features, including market-leading optical fluorescence technology, a high-visibility LCD screen, advanced probe design, and IEC 60601-1 3rd Edition compliance.

Proven technology and exceptional quality backed by Terumo's dedicated support make the CDI System 550 the smart choice.

Why you need to know the DO₂ story.

What is DO₂?

DO₂ is oxygen delivery or "O₂ delivery". It is an indicator of the amount of oxygen being delivered to the patient during bypass.

DO₂ is a calculated value based on the blood hemoglobin level, arterial oxygen saturation, pump flow and the arterial partial pressure of oxygen. It can be indexed to the size of the patient by using body surface area (BSA) in the formula. The CDI System 550 allows the user to enter the patient's BSA. DO₂ is expressed in mL/min or mL/min/m² if indexed to BSA. DO₂ is an important indicator of perfusion.

What is Acute Kidney Injury?

Acute Kidney Injury (AKI) is defined as an abrupt or rapid decline in renal filtration function. It is an episode of kidney failure or kidney damage that happens within a few hours or a few days. AKI causes a build-up of waste products in the blood and makes it hard for the kidneys to keep the right balance of fluid in the body.

Next to the brain, the kidney is very sensitive to the oxygen level in the blood as well as the flow rate. Less-than-optimal oxygen delivery can cause organ damage.

AKI results in longer ICU stays, longer hospital stays, and higher costs especially when the patient requires dialysis. Kidney injury can be chronic or acute, and increases morbidity and mortality.

Why does it matter?

O₂ delivery and O₂ consumption values provide the perfusionist valuable information for the maintenance of optimal metabolic performance of the patient while being supported on cardio-pulmonary bypass. This helps assure that all critical organs, including the brain, gut, liver and kidneys are having their individual oxygen demand needs met satisfactorily. The kidneys are particularly sensitive to even short-term oxygen deficit. Numerous clinical studies have demonstrated that careful monitoring of DO₂ during cardiac surgery and maintaining a threshold level during cardiopulmonary bypass dramatically reduce kidney injury.³

1. Ranucci M, et al. Effects of Priming Volume Reduction on Allogeneic Red Blood Cell Transfusions and Renal Outcome After Heart Surgery. *Perfusion*. 2015;30:120-126.
2. Dasta JF, Kane-Gill SL, Durtschi AJ, et al. Costs and Outcomes of Acute Kidney Injury (AKI) Following Cardiac Surgery. *Nephrol Dial Transplant*. 2008;23:1970-1974.
3. List of references can be found on our CDI Blood Parameter Monitoring System 550 Clinical References sheet.



The CDI® System 550 measures or calculates pH, pCO₂, pO₂, K⁺, temperature, SO₂, hematocrit, hemoglobin, base excess, bicarbonate, oxygen consumption and oxygen delivery



Monitor

- Large, color liquid crystal display provides high visibility at a variety of viewing angles.
- Self-diagnostic system verifies proper functioning of electronics and optics.
- System alerts provide visual and audible indicators when parameters fall outside user-specified limits.
- Integrated battery pack ensures uninterrupted operation for 25 minutes.
- Monitors blood/patient in either actual or 37° C temperature mode to allow for Alpha stat or pH stat management.
- Displays blood parameter values in either numeric, graphic, or tabular formats.
- Integral monitor printer provides documentation of system's self-diagnostics and calibration verification, as well as displayed values.
- Serial interfaces accept inputs from pumping system to use and display blood flow, and provide outputs to data management systems or transmission to other external devices.
- Built-in handle facilitates transportability.



Monitor Pole Clamp

that attaches to standard heart-lung machine poles.



Cable Head Bracket

Cable head assembly slides into the bracket for mounting to standard heart-lung machine poles.

Calibrator

- Fast two-point gas calibration assures shunt sensor is performing to specifications.
- Small footprint and built-in handle for transportability.
- Mountable onto monitor pole clamp.

Shunt Sensor

- Unique fluorescence sensor technology measures pH, pCO₂, pO₂, temperature and K⁺.
- Simple installation of the sensor into the shunt line using luer connections.
- May also be added after the initiation of bypass, facilitating set up in emergency cases.
- Treated with covalently bound, non-leaching heparin.

H/S Cuvette

- Optical reflectance technology provides accurate readings of venous SO₂/Hct/Hgb.
- Disposable cuvette clips easily to hematocrit/saturation probe.
- Available in three connector sizes: ¼ (6.4 mm) x ¼ (6.4 mm), ⅜ (9.5 mm) x ⅜ (9.5 mm), and ½ (12.7 mm) x ½ (12.7 mm) inches.



The CDI® System 550 quickly alerts users to changes in patient status

Continuous in-line monitoring during cardiopulmonary bypass surgery is a critical component of perfusion safety and improving patient outcomes. Studies have shown that appropriate regulation of blood gas parameters is essential to avoid the negative outcomes linked to sub-optimal blood gas parameter control.⁴ More precise and accurate control of blood gas parameters potentially improves:

- Cardiac function
- Renal function
- Pulmonary function
- Cerebral function
- Transfusion requirements
- Ventilator requirements
- ICU stays
- Post-operative hospital stays

Fast, easy set up



The shunt sensor is placed in the cable head.



The cable head, with sensor attached, is placed in the calibrator.



The sensor and probe head are installed in the circuit with two luer connections. The design allows placement in a variety of circuit locations.

Learn why the world's leading Cardiac Centers have trusted Terumo's CDI Systems for more than 30 years.

Ask your Terumo Cardiovascular Group representative for more information on peer-reviewed studies that link adequately maintained levels of oxygen delivery to improved outcomes and reduced hospital costs.

4. List of references can be found on our CDI Blood Parameter Monitoring System 550 Clinical References sheet.

Product Specifications

| Displayed Parameters | System Operating Ranges | System Display Ranges |
|---------------------------------------|-------------------------------------|-------------------------------------|
| pH | 6.80 to 7.80 pH units | 6.50 to 8.50 pH units |
| pCO ₂ | 10 to 80 mmHg (1.3 to 10.7 kPa) | 10 to 200 mmHg (1.3 to 26.7 kPa) |
| pO ₂ | 20 to 500 mmHg (2.7 to 66.7 kPa) | 10 to 700 mmHg (1.3 to 93.3 kPa) |
| K ⁺ | 3.0 to 8.0 mmol/L | 1.0 to 9.9 mmol/L |
| Temperature (T) | 15.0° to 40.0 °C | 1.0° to 45.0 °C |
| Oxygen saturation (SO ₂) | 60 to 100% | 35 to 100% |
| Hematocrit (Hct) | 15 to 45% | 12 to 45% |
| Total hemoglobin (Hgb) | 5.0 to 15.0 g/dl | 4.0 to 15.0 g/dl |
| Oxygen Consumption (VO ₂) | 10 to 400 ml/min | 10 to 400 ml/min |
| Oxygen Consumption (Indexed) | | 1 to 999 ml/min/m ² |
| Oxygen Delivery (DO ₂) | 10 to 2000 ml/min | 10 to 2000 ml/min |
| Oxygen Delivery (Indexed) | | 1 to 20000 ml/min/m ² |
| Base Excess (BE) | -25 to 25 mEq/L | -25 to 25 mEq/L |
| Bicarbonate (HCO ₃) | 0 to 50 mEq/L | 0 to 50 mEq/L |
| Blood flow (Q) | | 0.0 to 9.9 L/min |

| Product Specification | Size (H x W x D) |
|--------------------------------|-----------------------|
| Monitor with BPM and H/S probe | 28 cm x 38 cm x 17 cm |
| Calibrator | 32 cm x 21 cm x 26 cm |

Monitor Power Requirements and Specifications

100-240 VAC, 50/60 Hz

12 volt backup battery

Data Output Port: RS-232 serial interface

Pumping Systems Input Port: RS-232/RS-485 serial interface

Ordering Information

| Catalog # | Description | Units/Case |
|---|--|------------|
| Monitor Configurations | | |
| 550AHCT | Monitor with one blood parameter module and one hematocrit/saturation probe | 1 |
| 550AVHCT | Monitor with two blood parameter modules and one hematocrit/saturation probe | 1 |
| Calibrator | | |
| 540 | Calibrator | 1 |
| Accessories for Use with CDI® Systems | | |
| CDI506 | Gas A, calibration gas for use with Calibrator 540 | 1 |
| CDI507 | Gas B, calibration gas for use with Calibrator 540 | 1 |
| 7310 | Printer paper | 5 |
| CDI517 | Monitor pole clamp, 7" (17.8 cm) arm length, calibrator mount | 1 |
| CDI519 | Cable head bracket | 1 |
| Disposable Sensors for Use with CDI Systems | | |
| CDI510H | Shunt Sensor for use with CDI Systems, heparin treated | 20 |
| Disposable H/S Cuvettes for Use with CDI Systems | | |
| 6914 | ¼" (6.4 mm) connectors | 20 |
| 6913 | ⅜" (9.5 mm) connectors | 20 |
| 6912 | ½" (12.7 mm) connectors | 20 |
| 6934 | ¼" (6.4 mm) with 6" (15.2 cm) extension tube | 10 |
| 6933 | ⅜" (9.5 mm) with 6" (15.2 cm) extension tube | 10 |
| 6932 | ½" (12.7 mm) with 6" (15.2 cm) extension tube | 10 |

Display Update

Every six seconds

System Measurement Cycle Time

pH, pCO₂, pO₂ = one measurement per second

K⁺ = one measurement per six seconds

SO₂, Hct, Hgb = one measurement per eighteen milliseconds



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