PHOTOMETRIC BIOCHEMISTRY ANALYSER

CuBiAn® HT270

A fully automated biochemistry analyser in benchtop size. Determine process relevant data as concentrations of substrates, metabolites or protein. The fast and reliable way.

PRODUCT DESCRIPTION

The CuBiAn HT-270 is a bio-chemistry analyser, based on the photometric measurement principle. Within the family of CuBiAn systems, the HT-270 aims towards high-throughput applications, combined with the small footprint of a benchtop size. A versatile integration of hard- and software enables the analyser to become a very flexible and customizable tool in the bio-process analysis. Together with its siblings, the CuBiAn XC (extra compact) and the classic CuBiAn HT (high throughput) also known under the name of rxDaytona, the CuBiAn family of analysers has gathered a broad acceptance throughout the world of process development and production in the typical fields of the biotech, pharmaceutical, food & beverage and similar industry sectors.

The CuBiAn HT-270 is a major technical overhaul of the longstanding HT system with over 2500 active systems worldwide. A number of improvements in the entire system have made the unit capable of an overall performance with up to 270 analyses per hour and 404 when equipped with the ISE-Unit.
The CuBiAn family of analysers are fully automated, photometric based instruments. Wavelengths can be selected out of a range from 340nm - 800nm. The detector unit uses a disperser with a grading technique, to measure all chosen wavelengths at one time, which benefits in a notable improvement in performance. Reagents are stored on-board permanently, inside the reagent container unit. This is an actively temperature-controlled compartment where all substances kept cooled at 8°C for long term stability. A handy side-effect is, to just manually need to access them in the moment they got depleted. A total of 50 bottles can be stored inside the reagent container unit. Samples are placed in the sample container with a capacity of 50 tubes or cups, respectively. Both, the regent and sample tray are easily detachable to simplify handling of liquids. The HT-270 is equipped with two separate pipettes and mixer paddles, mounted to four robotic arms. Sample and reagent pipetting thus can be performed simultaneously and independent from another, also resulting a distinct improvement in the overall performance.

Reagent and sample are placed into semi-disposable cuvettes, mixed and reacted at constantly 37°C ± 0.1°C, inside the incubation unit which carries 72 high-precision, re-usable cuvettes. Each cuvette is permanently monitored in regard to optical quality. The fully automated washing unit performs cleaning and rinsing operations at runtime. The analyser can be equipped with an integrated ISE-Unit (Ion Selective Electrodes). This non-photometric based and optional module, delivers data on Na⁺, K⁺ and Cl⁻ analysis.

Device handling and user interaction is controlled by a fresh and modern user interface, running on an up-to-date personal computer with today’s current Windows operating system. The computer is robust, requires only a small laboratory footprint, is protected against water damage and can be integrated into enterprise networks. Export of measurement results can be carried out on screen, by printer and by file for import into Microsoft Excel and similar applications.
**Name of device**: CuBiAn HT-270 | Biochemistry Analyser

**Usage**
- General chemistry as photometric assay
- Immunology as photometric assay

**Assay type**
- 1 point end, 2 point end, 1 point rate, and 2 point rate

**Type of calibration**
- Factor, Linear, Point to point, Log-logit, Exponential, Spline, and Spline 2

**Throughput**
- 270 tests per hour

**Incubation time**
- Reagent 1 assay: 10 minutes (R1)
- Reagent 2 assay: 5 minutes (R1) + 5 minutes (R2)
  (Reagent 1 and reagent 2 assays can be set at the same time)

**Sample type**
- Presets configurable

**Number of simultaneous measurement**
- 50 methods (Max.) + 3 electrolyte (Na, K and Cl) methods (option)

**Utility Components**
- Built-in: External Tank Sensors; Optional: ISE Unit, Degassing Unit, Sample Barcode Reader, Reagent Barcode Reader, Clot Detection Sensor Unit

**Incubation Reaction Unit**
- Heating method: Direct heating by silicon-rubber heater
- Heating range: 37±0.1°C

**Cuvette**
- Material: Resin / Glass
  - Size (outside): 6(W) x 16.4(D) x 31.2(H) mm (Resin)
    6(W) x 7(D) x 30.2(H) mm (Glass)
  - Light length: 5mm
  - Quantity: 72
  - Minimum reaction volume: 100µL
  - Maximum reaction volume: 350µL

**Sample Container**
- Tube:
  - Diameter: 12mm to 16mm, Length: 75mm to 100mm
- Holding structure: Detachable turn table
- Number of sample tube:
  - Outer tray: 40 Sample tubes or Sample cups (Max.)
  - Inner tray: 10 Sample cups (Max.)

**Sample Pipette Unit**
- Liquid level detection: Micropipette with a liquid level sensor by sensing a change of capacitance
- Sampling volume:
  - Normal sample: 1.5µL to 35µL
  - ISE sample: 53µL (option)

**Reagent Container**
- Holding structure: Detachable turn table
- Number of reagent bottles:
  - 50 bottles (Max.)
    (70mL, 20mL-round, and 20mL-square bottles)
    Outer layer: 25 bottles(20mL bottle)
    Inner Tray: 25 bottles (70mL bottle)
- Cooling method: Cooling with peltier elements
- Cooling range: 8 to 15°C

**Reagent Pipette Unit**
- Liquid level detection: Micropipette with a liquid level sensor by sensing a change of capacitance
- Sampling volume:
  - R1: 20µL to 250µL, R2: 20µL to 180µL

**Detector Unit**
- Method: Measurement of absorbance (12 wavelength simultaneous measurement)
- Selectable Wavelength: 12 wavelength (340 to 800nm)
- Wavelength selection: Grating method
- Light source: Tungsten halogen lamp
- Cooling for light source: Air-cooled by fan

**Stirrer Unit**
- Stirring mechanism: Stirrer (stirrer paddle) driven by a stepping motor (in 5 speeds)
**Power Supply Unit**

- **Power requirement:**
  - AC100V to 120V, 6.5A (Max.)
  - AC200 to 230V, 3.3A (Max.)
  - 50/60Hz
- **Power Consumption:** 650VA
- **Permissible voltage variation:** ±10% (Max.)

**System Water Tank, Wash Solution Tank**

- **Tank capacity/quantity:**
  - Purified (system) Water Tank (20L): 1
  - Wash Solution Tank (5L): 2

**Wastewater Tank**

- **Tank capacity/quantity:**
  - High Concentrated Wastewater Tank (10L): 1
  - Low Concentrated Wastewater Tank (20L): 1

**Other major functions:**

- Auto Startup, Shut off and sleep; Interruption of STAT samples; Automatic sample dilution; Water blank measurement; Reagent blank measurement; Profile Order; Auto template function; Print format edit function; Host communication (RS-232C)

**Environmental Requirement**

- **Operating Temperature:** 15 to 30°C (Acceptable range: 2°C/hour)
- **Storage Temperature:** -10 to 50°C
- **Operating Humidity:** 45 to 85% or less (No condensation)
- **Humidity (storage/transport):** 45 to 85% or less
- **Operating Pressure:** 800 to 1060hPa
- **Pressure (storage/transport):** 500 to 1060hPa

**Dimensions**

- **Outside dimensions:** W870mm x D670mm x H625mm
- **Mass:** 120kg (Max.)

**Maximum sound level**

- 75dB (1m or longer distant from the analyzer with cover closed)

**Transient overvoltage**

- Overvoltage category II

**Rated pollution degree**

- Pollution degree 2
**TECHNICAL FEATURES AT A GLANCE**

**Photometric Measurement**

- The analyser’s basic principle of measurement uses the long established and well-accepted routines of enzyme-linked (assay specific) photometric-based analysis. Both, end-point and kinetic determination can be performed.

- The analyser can easily be adapted to process-specific needs. Measurement ranges can be customised; dilution steps are performed with automated precision.

- The combined features of the analyser enable a very high reproducibility of test results over a long period of time and across analysers. Calibration is only necessary per lot of reagents (i.e. once a week), not on a constant basis like other membrane-based systems.

- Open system: Settings and parameters are free to access, allowing the use or development of own custom-made assays.

**Sampling**

- Selection of applied methods per sample is fully independent.

- Small sample volume required (minimum of 100 µL).

- Ability to create templates and process IDs, to measure regularly recurring samples along certain time-spans.

- New samples can be added at any time during active measurement. Normal or emergency flag can be applied for samples with higher priority to be analysed before regular ones.

- Capacity for 50 sample tubes (40 regular + 10 for special use).

- Accuracy of pipetting volumes is regularly inspected not to exceed a CV of 2% for the sampling pipette and 1% for the reagent pipette, respectively.

**Quality Control**

- Open system: Calibration data is accessible and interpretable by human at any time and in full detail.

- The analyser’s QC entity offers a range of evaluation methods and settings, common in industry and science.

- Typically each method is monitored by controls of 3 concentration levels to guarantee accuracy and precision in the lower, middle and upper technical range.

**Data Management**

- Any type of data is ready to be exported at any time, for direct access on screen, to be sent to a connected printer or as a file to be imported and processed directly to Microsoft Excel or similar.

- The analyser uses the common ASTM protocol to interoperate with LIMS/LIS host computers.

**Ease of Use**

- Barcode readers in the reagent and sample container enable the analyser to automated registration of all relevant information, reducing repetitive work and preventing human errors.

- Templates can be used to register calibrators and controls in seconds.
## AVAILABLE ASSAYS AND RANGES
(As of January 2013)

<table>
<thead>
<tr>
<th>Assay</th>
<th>Range</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>0.010 - 1.25</td>
<td>g/L</td>
</tr>
<tr>
<td>Ammonia</td>
<td>23.4 - 1032</td>
<td>µmol/L</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.1 - 5.91</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0.865 - 16.6</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Ethanol</td>
<td>80 - 5000</td>
<td>mg/L</td>
</tr>
<tr>
<td>Glucose</td>
<td>0.036 - 6.14</td>
<td>g/L</td>
</tr>
<tr>
<td>Glutamate</td>
<td>0.11 - 10</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Glutamine</td>
<td>0.14 - 10</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Glycerol</td>
<td>14.5 - 2545</td>
<td>µmol/L</td>
</tr>
<tr>
<td>hc IgG</td>
<td>2.8 - 27.6</td>
<td>g/L</td>
</tr>
<tr>
<td>hs IgG</td>
<td>24.9 - 560</td>
<td>mg/L</td>
</tr>
<tr>
<td>Iron</td>
<td>2 - 197</td>
<td>µmol/L</td>
</tr>
<tr>
<td>Lactate</td>
<td>0.009 - 5</td>
<td>g/L</td>
</tr>
<tr>
<td>LDH L-P</td>
<td>8.8 - 635</td>
<td>U/L</td>
</tr>
<tr>
<td>LDH P-L</td>
<td>42.3 - 1150</td>
<td>U/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.208 - 3.27</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Phosphor</td>
<td>0.88 - 112.5</td>
<td>mmol/L</td>
</tr>
<tr>
<td>Total Protein</td>
<td>0.022 - 2.14</td>
<td>g/L</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>0.134 - 12.7</td>
<td>mmol/L</td>
</tr>
</tbody>
</table>

Units can be switched to certain demand, ranges can be adapted to specific requirements of changing processes, through auto-rerun/auto-dilution.
TYPICAL USE

Process development
The CuBiAn HT-270 analysing system is a perfect tool to keep track of even a broad number of subsequently running cell-culture processes. Statuses are determined fast and reliable, thus feed strategies can be developed quickly. This helps focusing on the number of relevant things in daily laboratory routine, without the hassle of time-consuming analysis.

Production
Strong requirements of QM are often an unbreakable union. A set of tools has already been prepared to validate the system and to qualify it for periodic checks of accuracy and precision. Reagents, calibrators and controls are produced and maintained by the internationally renowned company of Randox Laboratories Ltd. Any process relevant data can be transmitted to LIMS/LIS host computers via ASTM interface in real-time.

Research and teaching
Flexibility of soft- and hardware enables users to quickly adapt the analyser to new processes or existing assays to changed measuring ranges. Own custom developed assays can be estab-

CONCLUSION
The CuBiAn analysers have their roots in the Clinical Diagnostic sector, often requiring a 24/7 availability in environments way more rough. This makes them to ultimately reliable tools, able to withstand a broad lot of demanding routine. The terms of accuracy, reproducibility and reliability have been of utmost priority during development and production.

CuBiAn XC
The even more compact version of the CuBiAn biochemistry analysers, utilising the same principal and technologies. Being capable of 90 analyses per hour, this unit has its field of main application inside laboratories of a smaller up to medium sampling quantities. This all-in-one system, includes the computing system inside the main body, providing a touch-sensitive display for all user interactions.