Technical Data Sheet:
CULTEX® LTC-C
Computer-controlled Long-Term Cultivation System

Cultex® Technology
The Airborne Exposure Experts

The CULTEX® LTC-C Long-Term Cultivation System is the innovative solution for fully automated cell cultivation at the air-liquid interface (ALI) and allows cultivation periods of up to several weeks in continuous operation. Up to four incubator modules can be operated simultaneously. The main application field of the CULTEX® LTC-C is the generation of comparable cultures for mechanistic and toxicological studies.

Computer-controlled Long-Term Cultivation System

General features

- Automated cultivation technology for cell cultures at the air-liquid interface (e.g. cells of the respiratory tract)
- Cultivation period: up to several weeks
- Simultaneous supply of a maximum of 4 incubator modules
- Computer-controlled intermittent or continuous medium supply with regard to medium exchange, agitation and mixing
- Saving of manpower and avoidance of staff-dependent influence and variations

Application areas

- Air-lifted cultures
- Cells from the respiratory tract
- Skin cells
- Cell lines
- Human and animal primary cells
- Mono- and/or co-cultures
- Generation of comparable cultures for mechanistic and toxicological studies

Clients

- Universities
- Regulatory bodies
- Military
- Pharmaceutical, chemical and tobacco industry
- Contract research laboratories

Basic principles of the LTC-C cultivation system

Module design

- The incubator module hold up to 24 cell culture inserts (e.g. Transwell® or Falcon®, size 12 mm) and is connected to the control unit via two tubes and two electric connector cables.
- The **incubator module** consists of the sample uptake (autoclavable) and supply module, which can be operated under cell-specific conditions in a CO_2 incubator.
  - The **sample uptake module** has a medium in- and outlet. A motorized mixing disc at the base of the supply module ensures a homogeneous mixture of existing and fresh medium after a partial medium change.
  - The **supply module** houses
    - the geared motor for the mixing disc,
    - an air bubble precipitator for the fresh feed medium
    - a temperature sensor underneath the cover plate for monitoring the temperature of the medium,
    - an ultrasonic sensor for adjusting the medium fill level in the sample uptake module
  - The **control unit**, equipped with an integrated web server, is located outside the incubator. Integrated in this are a programmable logic controller (PLC), a pump for the supply of medium to the incubator module and one for the removal of the medium. The pumps are incorporated inside the control unit in a sliding cassette, the LH module (LH = **L**iquid **H**andling).
  - LH module (LH = **L**iquid **H**andling):
    - The main components of the LH module are the two pumps for medium supply and removal.
    - The heat exchanger (preheating of the fresh medium to 37°C). Control by two redundant temperature sensors and an excess pressure valve guarantees trouble-free operation.
    - The leakage sensor. All medium-carrying components can be autoclaved.
- Visualization of the procedures and measured data is carried out by the web browser, e.g. via a laptop computer. The controls can also be accessed via the web browser, to change settings, for instance. The computer itself does not carry out any control tasks, whereby the management of the cell cultures continues even if the computer operating system breaks down.

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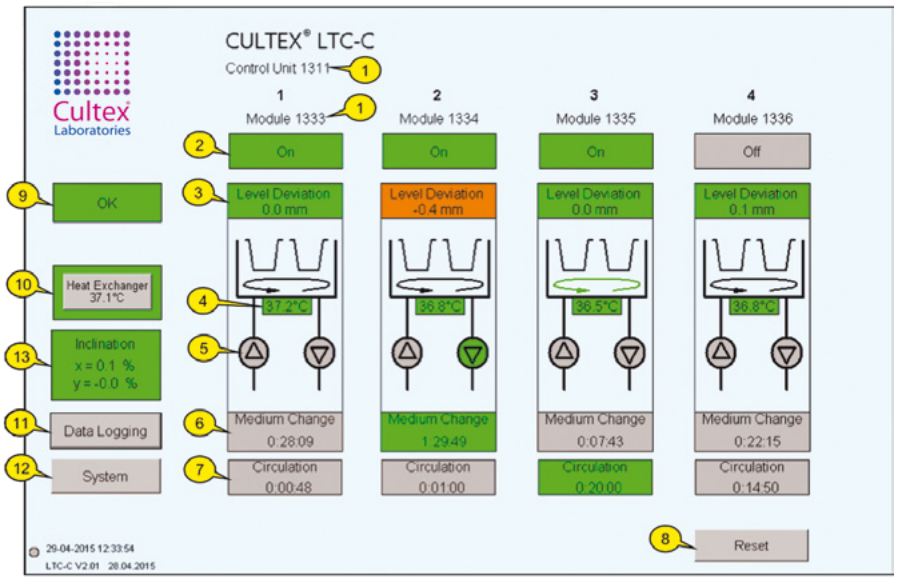
Control Software

- Operation of up to 4 modules with one control unit by using a web browser (JAVA plugin). The main window supplies the most important information on current and/or pending process steps and offers direct access to all secondary windows for further adjustment:



Main window of the control software

1. Text boxes
2. Status indicator
3. Level deviation
4. Temperature
5. Symbols for sample uptake chamber/pumps
6. Medium exchange
7. Circulation
8. Reset
9. Status display OK
10. Heat exchanger
11. Data logging
12. System
13. Inclination

Handling

- Operation of the CULTEX® LTC under cell-specific conditions inside a CO_2 incubator
- Control unit outside the CO_2 incubator
- Preheating of the fresh medium by a heat exchanger in the control unit
- Air bubble precipitator
- All cell or medium housing components of the system are autoclavable

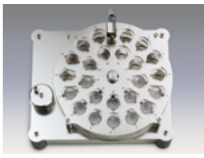
Performance

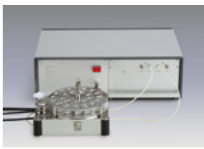
- Requires less manual work and saves manpower
- Computer-controlled continuous or intermittent medium supply of the cultures
- Computer-controlled medium exchange (volume fractions or the total volume of the incubator module)
- Computer-controlled circulation of the medium via a mixing disc
- Control of the medium level by an ultrasonic pulse-echo sensor

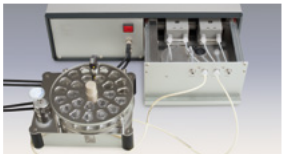
Literature

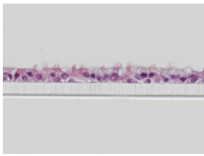
Aufderheide M[1], Förster C[2], Beschay M[3], Branscheid D[4], Emura M[5].

A new computer-controlled air-liquid interface cultivation system for the generation of differentiated cell cultures of the airway epithelium. Exp Toxicol Pathol. 2016 Jan; 68(1):77-87. doi: 10.1016/j.etp.2015.10.001.









Appendix

Aufderheide M[1], Förster C[2], Beschay M[3], Branscheid D[4], Emura M[5]. A new computer-controlled air-liquid interface cultivation system for the generation of differentiated cell cultures of the airway epithelium. Exp Toxicol Pathol. 2016 Jan; 68(1):77-87. doi: 10.1016/j.etp.2015.10.001. Epub 2015 Oct 24.

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