VACUCCELL® EVO
Vacuum drying oven with automatic temperature and vacuum control

INNOVATIVE HEAT TECHNOLOGY

protecting human health
Tradition, Quality, Innovation

Since its establishment in 1921, BMT Medical Technology s.r.o., the traditional manufacturer of medical and laboratory technology, has been gradually transformed from a small regional company to an international corporation.

In 1992, it became a member of the European MMM Group which has been operating on the world markets since 1954 as an important supplier of systems for the health care industry, science and research.

With its comprehensive offer of products and services, sterilization and disinfection devices for hospitals, scientific institutes, laboratories and pharmaceutical industry, MMM Group has established itself as an outstanding quality and innovations producer on the global markets.

The knowledge and experience gained during the implementations of individual supplies for our customers all over the world, and the technical innovations have been permanently and positively influencing the development, construction and production of our devices. High level of our work has also been confirmed by the number of patents and industrial designs as well as an easy implementation of individual device adjustments.

MMM Group – excellence in medical and laboratory technology.

Basic Characteristics
- Inner volume: 22, 55, 111 litres
- Temperature range: from 5°C above ambient to 250°C
- Door window
- Access port 40 mm with shell outlet
- Inert gas connection
- Large-surface door overpressure valve "Ventiflex"
- Inner chamber: stainless steel DIN 1.4571 (AISI 316 Ti)
- Aluminium shelves Servotherm with direct heat exchange (conduction) system

Vacuum Drying Oven with Automatic Temperature and Vacuum Control

The VACUCELL® device is designed for perfect drying of materials, parts and samples up to constant weight, in vacuum, with possible protective atmosphere in inert gas. The VACUCELL® line is characterised by noise-free operation and fine heating and it offers equal and safe drying of thermo-labile, oxidation-sensitive or powder materials in laboratories, as well as shape-complicated products with many holes and threads in industry. The device offers high service comfort and exact regulation of temperature and vacuum and that is why it is suitable even for demanding and exact tests and processes.

The device can be implemented in pharmaceutical, cosmetic, chemical, electro technical, petrochemical, air and tobacco industries, in the field of redevelopment technologies, space research and manufacture of health and medical means. On request, the device can be completed with a "Vacustation" base, with or without selected vacuum pump type.

The devices of the VACUCELL® line meet the requirements of technical and legislative regulations in the CR and EU as well.

Applications

**Pharmaceutical Industry**
- Drying of primary materials and finished products without air access.

**Electronic Industry**
- Low-temperature drying of electronics boards at 80°C.

**Cosmetic Industry**
- Extraction of scent concentrates for perfumes production

**Manufacture of Health and Sanitary Means**
- Testing of contact lens, low-temperature drying of primary materials for implants.

**Plastic Processing Industry**
- PET analyses, nano-compounds obtaining.

**Redevelopment Technologies**
- Low-temperature drying of devices and electronic components, archive paper prints after natural disasters (like floods, fire extinguishing with water).

**Petrochemical Industry**
- Division of hydrocarbons, drying of temperature-instable resins and solvents under lower temperatures in vacuum.

**Chemical Industry**
- Fine drying of labile compounds without oxygen access.

**Aerospace Industry**
- Fine drying of precise components of titan and duralumin after washing, before assemblage in clean premises, drying of rocket fuels components without oxygen access.

**Tobacco Industry**
- Drying of tobacco samples in quality control laboratories.
The New Control System Offers

- 5.7 inch (14.5 cm) touch screen display
- Microprocessor fuzzy logic process control
- Intuitive control via colour icons
- Graphic configuration of a new program
- Transparent displaying of data course at the cycle
- Protective thermostat class 3
- Acoustic and visual alarm
- Multi-level users administration (corresponding to FDA 21 Part 11)
- Keyboard lock against unauthorised handling

- Data encryption and non-manipulability (corresponding to FDA 21 Part 11)
- Up to 100 programs and up to 100 segments for each program
- Yearly data logger in graphic and numeric form
- On-line or off-line data export
- Prepared service programs for fast diagnostics of faults
- Easy service diagnostics including remote access
- Multi-language communication
- Direct printing of protocols in PDF format via Warmcomm 4.0
- Easy user configuration of the device

- SD memory card, USB Host and RS 232 standardly included
- WiFi connection, USB device or Ethernet interface with own IP address for remote data transfer, control and diagnostics (optional equipment)
- Programming of ramps, real time and cycling
- Main ON/OFF switch for security reasons
- Device state LED indicator

Connectivity

- SD card
- RS 232
- USB Device
- Ethernet / Internet (optional equipment)
- WiFi (optional equipment)
- USB Host (optional equipment)
- BMS remote alarm (optional equipment)

Data Output

Thanks to use of state-of-the-art electronic components, the VACUCELL® EVO device has no limitations in data peripherals connections. The basic configuration contains the traditional and reliable interface RS 232, USB Device and an SD card as a data carrier. The device can be easily completed with a Wi-fi module 802.11b/g with up to 100 meters reach, there is also available the USB Host port two-directional USB communication and the Ethernet (RJ 45) interface for remote connection. The proper IP address allows easy connection to a PC or selected printer, respectively other ordinary data peripheral (Smartphone, Netbook, etc.). Thanks to open platform and adjusted data format it is also possible to configure remote connection and with data online, in remote mode (Internet).

WarmComm 4.0

Universal Data Administration with Devices of the MMM Group

- connectible to all the devices of the MMM Group
- stable platform of the SQL library
- user-friendly environment
- Connection via the Ethernet to unlimited number of devices via RS 232, USB, then limited by the number of PC ports
- bilateral communication – data monitoring and device control
- compatibility with older lines of heat technology devices
- Client-Server architecture
- service module for local and remote diagnostics
- three levels depending on client’s requirements (B-P-F)
- compliance with FDA CFR 21 Part 11 (version F)
- web support, on-line updates
- protected licence policy
- unpretentious to HW requirements, compatible with MS Windows
- validation documentation IQ/OQ
VACUCELL® EVO
Comfortable Device with Excellent Parameters

MMM Group traditionally offers a wide range of case sizes, from the smallest volume of 22 litres up to 111 litres, with the best price to performance ratio. The patented system of shelves placement with direct heat exchange Servotherm provides fast heating of samples and uniform space distribution of temperature.

Extensive experience of our engineers and many years of careful development of regulation SW contributed to unique control system Fuzzy Logic. The Fuzzy Logic is used for continuous assessment of process values, like chamber size, pre-set program parameters, number of samples inside the chamber and then, the heating performance and vacuum control is optimised.

Rugged construction of stainless steel chamber and door fixed in four points, with safety system Ventiflex, completed with armed glass allow tests even under extremely low vacuum.

Practical, large and well-proved handle, rugged braked wheels of the optional Vacustation case and main door openable up to 220° support very user-friendly character of the device. The combination of light grey and light blue colour, highlighted with a dark blue smiling control panel, establish everyday harmony feelings of the users.

Vacuum access port DIN 40 mm for placement of standardised electric or mechanic access ports to the chamber

New construction of the device extension for easy service access

Wi-fi connection for wireless connection to PC/SMARTPHONE (optional equipment)

New smart design with user friendly control panel

Memory SD card for data transfer

Microprocessor control Fuzzy Logic for minimisation of start-up times

S-layer efficient chamber insulation for long-term stability of temperature parameters in the chamber

Simply removable inner side plates for easy cleaning of the chamber

Ergonomic handle with new mechanics for easy and safe door closing (patent protected)

Heating elements placed directly on the device chamber for efficient heat exchange, avoiding condensation on chamber walls

Vacustation – practical base case for vacuum pump placement

Caster with a break for easy and safe handling of the device (Vacustation 22, 55, 111)
Fast and uniform heat transfer to samples under any pressure conditions is the basic parameter of every vacuum drying oven. Another key element is the whole chamber heating, so as to avoid residual steam condensation on chamber walls. Our designers developed a simple but intelligent system of shelves fixation in the chamber, meeting the parameters of fast heat transfer under low production costs. The stainless steel chamber is heated by powerful heating elements, fixed on external surface of the chamber. The heat passes through the chamber material and heats its complete inner surface. Precisely milled aluminum shelves carriers put on the inner wall of the chamber are in strong contact with the chamber surface and so they absorb significant portion of heat. Thanks to large surfaces of diagonal contact and thanks to their own weight, the precisely manufactured aluminum shelves create ideal conditions for heat transfer to shelves material. Sufficiently strong body of the shelf distributes the heat in its complete surface and it is ready to pass the heat to samples in the chamber. The clever solution is demanding only in relation to precise workshop processing, but it is simultaneously easy to dismantle for cleaning and it is ready for adding or removing shelves depending on user’s current needs. Simultaneously, this solution avoids development of cool spots in the chamber and so it avoids the risk of condensation and samples contamination. The shelves and sides are made of high-quality ground aluminum, allowing extremely fast heat transfer by conduction. If there is a risk of aluminum corrosion in aggressive environment, we recommend ordering of a stainless steel set (shelves + sides) instead of the aluminium one.

The door construction of all the MMM/BMT drying ovens meet all and any safety regulations of the EU. The four-point door fixation to the shell, patented traditional system of two door locks with a large handle and an inner panel of the door fixed independently on the door shell – these are the elements supporting excellent ergonomics of daily device door handling and while respecting the manufacturer’s instructions they arrange maximal safety of drying and samples heating. But anyway, under some circumstances there may occur an undesirable reaction of samples with air oxygen and development of intensive overpressure in the chamber. In case of such an overpressure occurrence, VACUCELL® represents a unique solution exceeding standard safety limits. An inner panel of stainless steel frame and 2 cm thick armored glass is mounted on the door body using four guide rails and four strong springs. In case of undesirable overpressure in the chamber, the four strong springs release the armored glass panel from its position on the sealing in the chamber and they allow excessive gas release to the atmosphere. In this way, there is completely eliminated the risk of further accumulation of pressure in the chamber and possible explosion causing the device deformation. In this way, the inner panel creates a large-surface overpressure safety valve. In the course of standard work, the armored glass perfectly seals on special silicon sealing of the chamber and so it develops conditions even for work in extreme vacuum with low pressure loss. Another advantage is the fact that the user may use such a constructed door window, protected from the outside by hardened acrylic glass for samples monitoring. The window may optionally be equipped LED lighting of the chamber, switched by touch chip directly on the window surface.

The door construction of the device is equipped with automatic pressure regulation system. According to user-set program configuration, the microprocessor-controlled automatics controls two precise pressure valves Danfoss. In this way, the system allows highly precise pressure decrease (negative regulation) or pressure increase (positive regulation) in the chamber. These cycles may be repeated as needed and – together with temperature regulation – there may be set any pressure and temperature conditions. For example, after heating up it is possible to repeatedly dry the industrial samples with complex hollows, to dry pharmaceutical material on exact pressure level or to use a pressure ramp to slowly aerate dried powder materials. In the device configuration, it is also possible to setup monitoring of any safe limit of heating depending on vacuum reached for concrete chemical substances. If it is necessary to heat material in inert atmosphere, just connect the device to input valve (IN) for inert gas intake and the control system of the device will keep the inert atmosphere for the whole time of the cycle duration. Each device configuration also includes the possibility of pressure regulation hysteresis adjustment, i.e. a regulation range within which the device will keep the pressure level in the chamber during tests under constant pressure – e.g. 10 mbar ±5 mbar. If it is necessary to interrupt drying of samples, it can be done semi-automatically directly from the control panel or manually, using an additional valve to aerate the chamber and open the door of the device.

Vacuum drying oven needs a vacuum source. The vacuum pump (vacuum source) is not included in basic equipment of the device. The device delivery includes two stainless steel flanges DIN 16 with an extension (Ø 12 mm) and flexible silicon hose, length 2.5 m. Suction in the chamber can be reached using any available vacuum pump that must be installed in such a way that it is connected to the outlet extension of the vacuum pump and simultaneously to the built-in socket in the device (voltage 230 V or 115 V according to nominal voltage of the drying oven). In this way, the automatics of the device may actively monitor the pressure level in the device chamber and – depending on configuration – reduce vacuum pump wear and tear by continuous switching on and off. But naturally, the central source of vacuum in a lab (if available) can also be used as a vacuum source. In this case, the device will regulate the vacuum level in the chamber through the automatic valve only.

Quick and efficient recycling, and active protection of the environment.

Performance features:
- outstanding chemical resistance and superior vapor tolerance
- high performance even at low vacuum levels
- optimized vacuum even with gas ballast for condensate purge
- whisper quiet and very low vibration
- excellent environmental friendliness due to efficient solvent recovery

Recommended vacuum pumps

**Vacuum BAC**
- **Vacuum Brand MZ 2C NT AK+EK (2 l/min, 12 mbar)**
- **Vacuum Brand MD 4C NT AK+EK (3.4 m³/h, 1.5 mbar)**
Each VACUCELL® EVO device is delivered with standard equipment that does not have to be additionally ordered and it is included in the delivery:

### Optional Equipment

- Flexible temperature sensors
- Set of sides and shelves – stainless steel AISI 316 Ti
- Extended data module: USB Device, Ethernet and Wi-Fi interface
- Mechanical door lock
- Electromagnetic door lock
- Servotherm shelves (Al or stainless steel)
- Programmable inner socket
- External printer
- Multi-point temperature measuring
- Protocols IQ/OQ
- Vacuum pumps Vacuubrand MZ 2C NT AK+EK, MD 4C NT AK+EK
- Vacustation – base case
- Inner lighting of the chamber
- Software WarmComm 4.0
- Communication ports RS 232 and USB Host
- SD card
- Universal stainless steel access port DIN 40 mm
- Touch screen
- System Servotherm including Al shelves and Al sides (side plates)
- High-strength stainless steel chamber AISI 316 Ti
- Multi-conductor temperature sensor
- Door window
- Manual/emergency aeration valve
- Automatic vacuum regulation, including two flanges DIN 16 and silicon hoses (¥8x18 mm)
- Door view
- Safety system Ventiflex
- Vacuum connection vacuum connector DN (KF) 16

### Technical Parameters

**VACUCELL® EVO (VU EVO) 22, 55, 111**

<table>
<thead>
<tr>
<th>Technical data</th>
<th>volume cca l</th>
<th>22</th>
<th>55</th>
<th>111</th>
</tr>
</thead>
<tbody>
<tr>
<td>width mm</td>
<td>340</td>
<td>400</td>
<td>540</td>
<td></td>
</tr>
<tr>
<td>depth mm</td>
<td>260</td>
<td>320</td>
<td>410</td>
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</tr>
<tr>
<td>height mm</td>
<td>300</td>
<td>420</td>
<td>480</td>
<td></td>
</tr>
</tbody>
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**External dimensions**

| width mm       | 540          | 620| 760|
| depth mm       | 500          | 560| 650|
| height mm      | 780          | 910| 960|

**Package – dimensions**

| width mm       | 730          | 980| 980|
| depth mm       | 720          | 820| 820|
| height mm      | 1090         | 1290| 1290|

**Weight**

| nett cca kg   | 68           | 101| 133|
| brut cca kg   | 80           | 117| 150|

**Shelves**

| shelves       | max. No.     | 5  | 8  | 9 |
| standard equipment | psc. | 2  | 2  | 2 |
| min. distance between screens mm | 40  | 40 | 40 |

**Storage area mm**

| 280x238       | 340x296      | 480x386|

**Maximal load for a shelf kg**

| for a shelf kg | 20  | 25  | 25 |
| total inside of device kg | 35  | 45  | 65 |

**Number of outer metal doors**

| 1  | 1  | 1 |

**Electrical data**

| max. power W | 800 | 1200| 1800|
| mains 50/60 Hz V | 115/230| 115/230| 115/230|
| Protective system | IP20 | IP20 | IP20 |

**Temperature data**

| Working temperature from 5°C above ambient to °C | 250 | 250| 250 |
| Temp. deviations acc. to DIN 12 880 from working temperature (Al racks, pressure 5–10 mbar) ** | in space at 100°C ± °C | 2 | 2 | 3 |
| in space at 200°C ± °C | 5 | 5 | 5 |
| in time °C | 0,4 | 0,4 | 0,4 |
| Temp. deviations acc. to DIN 12 880 from working temperature (stainless racks, pressure 5–10 mbar) ** | in space at 100°C ± °C | 10 | 11 | 11 |
| in space at 200°C ± °C | 18 | 23 | 23 |
| in time °C | 0,5 | 1 | 1 |

**Time of rise onto 98% voltage 230 V – Al racks, pressure 5-10 mbar**

| onto temp. 100°C min | 60 | 65 | 110 |
| onto temp. 200°C min | 80 | 86 | 130 |

**Time of rise onto 98% voltage 230 V – stainless racks, pressure 5-10 mbar**

| onto temp. 100°C min | 130 | 140 | 170 |
| onto temp. 200°C min | 190 | 220 | |

**Heat emission at 100°C W**

| 150 | 260 | 370 |
| 300 | 520 | 750 |

**Vacuum connection**

| vacuum connector DN mm (KF) | 16 | 16 | 16 |
| max. attainable vacuum mbar | <5·10–4 | <5·10–4 | <5·10–4 |
| chamber leakage mbar | <5·10–3 | <5·10–3 |

**Measuring access port DN mm (KF) | 40 | 40 | 40 |

**Connection (including hose terminal Ø 12 mm)**

| for inert gas or air DN mm (KF) | 16 | 16 | 16 |

### Note

- All technical data are related to 22°C ambient temperature and ±10% voltage swing (if not specified).
- Not measured
- *) Heat transport to sample in shelves under vacuum is performed through shelves leads; that is why the above stated temperature variations apply to temperatures on shelves surfaces; the measuring sensors must be in perfect heat-conductive contact with the shelf surface. Samples placed on shelves must also be in perfect contact with shelves, the temperature of samples depends mainly on their physical characteristics and on contact with the shelf.

The values may differ depending on specific charge and media parameters.

Change in the design and make reserved.
Make Acquaintance With Our Further Offers...

**Laboratory Ovens and Incubators**

- **INCUCELL® / INCUCELL® v**
  Suitable for safe treatment of microbiological cultures
- **FRIOCELL®**
  Cooling incubators
- **CLIMACELL®**
  Climatic chambers
- **CO2CELL**
  CO₂ atmosphere

**Sterilization and Depyrogenation**

- **ECOCELL®**
  The highly cost-effective heating oven series for simple drying processes
- **DUROCELL**
  Special-purpose drying ovens
- **DUROCELL with highly resistant EPOLON coating**
- **VACUCELL®**
  Vacuum drying ovens
- **STERICELL®**
  Intended for hot air sterilization of materials under specified temperature and duration.
- **VENTICELL®**
  Drying ovens with forced air circulation

**Steam Sterilizers (Autoclaves)**

- **STERILAB®**
  Small steam sterilizer, 25 l
- **UNISTERI® HP IL**
  Medium-sized steam sterilizers, 73–254 l
- **STERIVAP® HP IL**
  Large steam sterilizers, 148–1490 l

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