



# Steam Sterilizers for Life Science

Research and laboratory applications

Flexible solution concepts  
for unique applications



# Sterilizers from MMM

Individual design, equipment, and process controls

Based on our personal consultations, we develop solutions which are individually adapted to the specific needs of our customers—down to every last detail. The MMM sterilizer concept is highly modular and customizable, while also providing safety, cost-effectiveness, dependability, and sustainability.

## Areas of application



MICROBIOLOGICAL LABORATORIES



RESEARCH LABORATORIES



ANIMAL SCIENCES



FOOD PROCESSING INDUSTRY



## The right process for each individual application

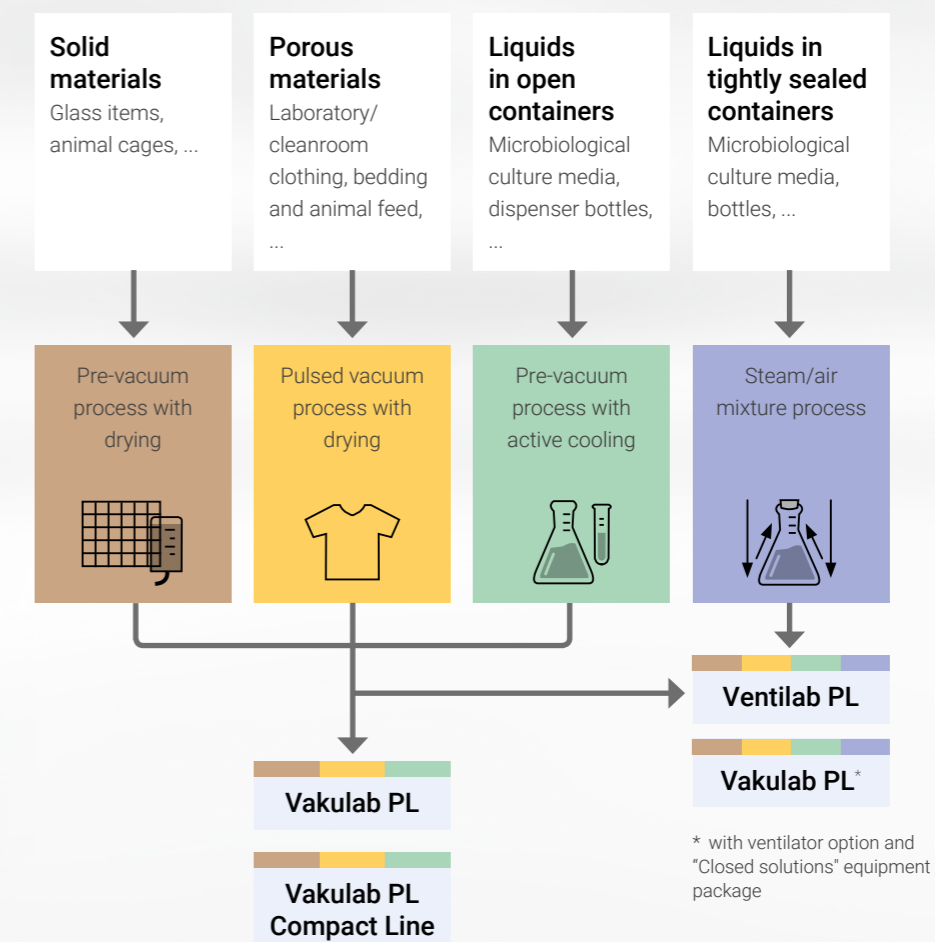
Laboratory and industrial applications primarily use the following processes:

### Saturated steam process

- » Pre-vacuum process with drying (solid materials)
- » Pulsed vacuum process with drying (porous materials)
- » Pre-vacuum process with active cooling (liquids in open or loosely sealed containers)

### Steam/air mixture process with active cooling

(liquids in tightly sealed containers)



Naturally, MMM sterilizers satisfy all quality-related requirements and are in conformity with the following directives, standards, guidelines, and regulations:

- |                  |                 |            |                               |
|------------------|-----------------|------------|-------------------------------|
| • PED 2014/68/EU | • MD 2006/42/EC | • AD 2000  | • DIN EN 13445                |
| • DIN 58951      | • DIN EN 62304  | • GLP      | • Biological Agents Ordinance |
| • GenTSV         | • TRBA 100      | • TRBA 200 | • GMP                         |

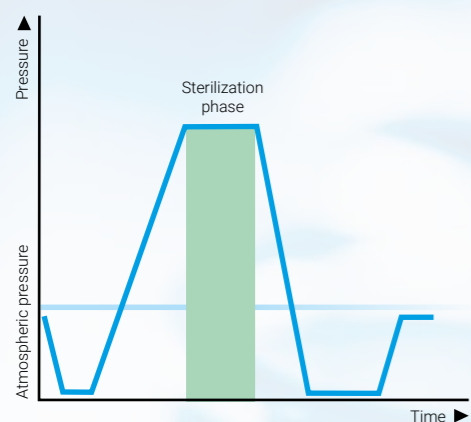


Combined with robust, high-quality craftsmanship over a broad vertical range of manufacturing, our sophisticated control systems ensure that even the strictest requirements are met. MMM produces its equipment from top-quality materials on state-of-the-art machinery. Qualified staff and process-oriented quality assurance guarantee consistently high standards.



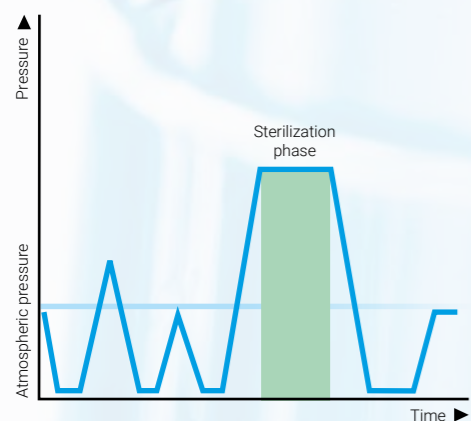
## Solid and porous materials

## Liquids



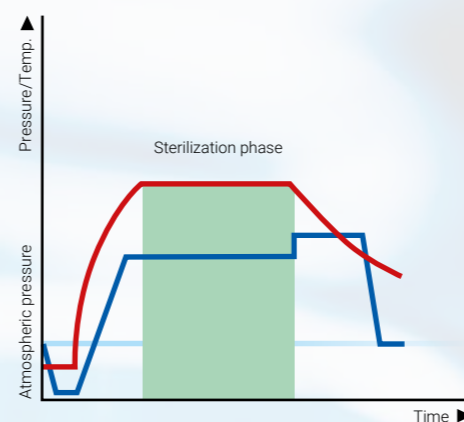
### Pre-vacuum process with drying

Solid materials with plain surfaces (e.g., instruments, cages, glass items, etc.) can be sterilized effectively and cost-efficiently using the pre-vacuum process. In this process, the air in the chamber is first removed before saturated steam is continuously introduced until a defined sterilization pressure is achieved. After the sterilization phase, the materials being treated are dried using a vacuum. The temperature range for the sterilization phase can be set between 105 °C and 134 °C.



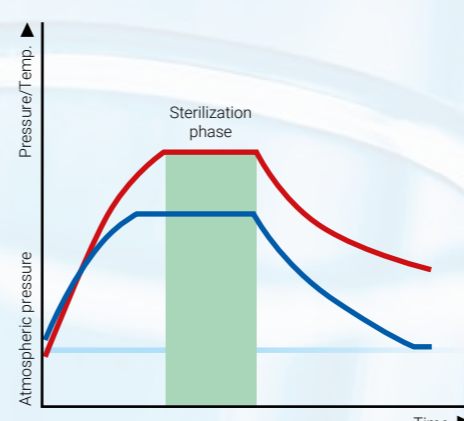
### Pulsed vacuum process with drying

For materials with porous surfaces (such as laboratory clothing, filters, long hoses or tubes, bedding, animal feed bags, etc.) that are difficult to de-aerate, the pulsed vacuum process is a useful method. This process utilizes repeated vacuum extractions combined with steam pulses for particularly effective removal of any air present. If necessary, the drying phase can also take place across several pulsed rounds. The temperature range for the sterilization phase can be set between 105 °C and 134 °C.



### Pre-vacuum process with cooling or steam/air mixture cooling

Liquids in open or loosely sealed containers (e.g., culture media, dispenser bottles, etc.) can be sterilized fast and effectively with the simple pre-vacuum process. The temperature range for the sterilization phase can be set between 105 °C and 134 °C. The material is then cooled to less than 80 °C using active jacket cooling. At the same time, a compressed-air cushion prevents the liquid from boiling over.



### Steam/air mixture process

The sterilization of liquids in closed containers poses a special challenge for process control, as the inside pressure in tightly sealed containers increases significantly when the liquid expands during the heating phase. To prevent the containers from bursting or deforming, a back pressure equal to the inside pressure in the container is generated in the chamber using compressed air. A mixture of steam and air is used as a heat transfer medium. To improve the transfer of heat and achieve an even temperature distribution, the steam/air mixture is continuously circulated inside the chamber by a fan. The fan is powered via a magnetic coupling, without any seals or gaps.



# Animal sciences

We develop and supply solutions and processes for safe animal care with sterile equipment and gently sterilized feed. In doing so, we help to ensure that animals are handled safely and carefully.

## Laboratory application

Sensitive products require both reliable sterilization and gentle treatment. MMM offers additional equipment components that provide exactly what is needed.

Application	Temperature	Description
<b>Programs for solid and porous materials</b>		
Solid materials	134 °C	Program for solid, temperature-resistant sterilization materials with plain surfaces.
Solid materials	121 °C	Program for solid sterilization materials with plain surfaces and low temperature resistance.
Porous materials	134 °C	Program for solid and porous materials
Porous materials	121 °C	Program for solid and porous materials with low temperature resistance.
Filters	121 °C	Program for pressure-sensitive membrane filters (e.g., made of cellulose acetate, polyamide or other similar materials), incl. assembled units.
Heating		Program for heating the sterilization chamber and piping.
Vacuum test		Feature for testing the chamber for leaks.
<b>Programs for solutions</b>		
Cold solutions	121 °C	Program for cold solutions, preparatory sterilization: culture media and suspensions. Disposal sterilization: cultures, contaminated lab utensils requiring processing.
Hot solutions	121 °C	Program for solutions introduced at higher temperatures (preparatory or disposal sterilization).
Petri dishes	121 °C	Program for wet disposal sterilization of disposable materials.

### Typically treated materials

- » Filters, liquids in open or loosely sealed containers
- » Glass items
- » Textiles
- » Tubing and hoses
- » Culture media

### Air detector

**Increased process reliability thanks to "Air Free"**

- » Air-detection device: documented process reliability
- » Simple process monitoring
- » Online monitoring while program is in progress

### Sterile-filtered compressed air

**Sterile-filtered compressed air is used to sterilize liquids.**

- » In-line sterilization of the compressed air filter
- » Highly reliable sterilization: Contamination of compressed air is not possible
- » Available connections for manual filter integrity tests

Application	Temperature	Description
<b>Programs for solid and porous materials</b>		
Supply containers	134 °C	Program for feed, bedding, and sterilizable materials for lab animals in supplier containers.
Polycarbonate cages	118 °C	Program for empty animal cages made of polycarbonate, e.g. Makrolon. Also for the disposal sterilization of used cages with residual bedding.
Bedding + feed	121 °C	Program for bedding and animal feed in bags.
Cages + feed	118 °C	Program for polycarbonate animal cages with bedding, and for porous materials with lower temperature resistance (preparatory sterilization).
Porous materials	134 °C	Program for porous materials and for temperature-resistant animal cages and bedding.
Vacuum test VT		Feature for testing the chamber for leaks.
<b>Programs for liquids</b>		
Drinkable solutions in polycarbonate containers	118 °C	Program for drinkable solutions in open or loosely sealed polycarbonate containers.
Solutions and drinkable solutions	121 °C	Program for cold solutions or drinkable solutions in open or loosely sealed glass containers.

### Typically treated materials

- » Animal cages
- » Bedding
- » Feed
- » Feed bags
- » Dispenser bottles



## Impressive design

Getting the machine into the building is often the first challenge faced during installation. At MMM, we're always mindful of the transport and assembly conditions, as well as the workflows required on-site.

- » Delivery into building in stages
- » Small footprint thanks to compact design
- » Ergonomic loading and working height
- » Front-side maintenance access for easier service
- » Single and double-door models
- » Height-adjustable outer frame on machines with floor-level loading

## Doors and quick-action closures

The automatic doors are equipped with a safety system featuring redundant pressure sensors and position switches that prevent the sliding doors (which are powered by electric motor) from being opened while a program is in progress or the chamber is pressurized.

### Safety & quality are the top priority

- » Door safety system: Cannot be opened when chamber is pressurized, cannot be closed if obstacles are present in door path
- » Door interior made of 1.4404 (AISI 316 L)
- » Exterior made of 1.4571 (AISI 316 Ti)
- » Door seal can withstand steam or compressed air
- » Silicon cord seal (FDA-compliant)
- » Contact-sensitive safety strip



On walk-in chambers, additional safety buttons prevent people from being trapped.

## Dual function for separation

In many cases, the sterilizer separates two areas of a laboratory. To maintain the difference in pressure between these two areas, the sterilizer is equipped with an air-tight partition in the assemblies compartment.

The control system also prevents both chamber doors from being opened at the same time. Even when the machine is switched off, at least one of the two doors is always pressurized to ensure air-tight separation.

### Leak-tight

- » Air-tight separation available in stainless steel 1.4301 (AISI 304)
- » Chamber designed as airlock
- » Not possible for both doors to be open at same time
- » Sound-insulated separation, approx. 40 db (optional)
- » Superior safety: Automatic switching of door sealing medium to maintain separation effect in the event of a pressure drop.
- » Gas-tight design, e.g. BSL3 (optional)



Gas-tight separation





# CUSTOM STERILIZATION CHAMBER B E R



The centerpiece of every steam sterilizer is the sterilization chamber. Robotic technology combined with high-precision manual craftsmanship results in chambers built with superior quality. Made in Germany.

## Pressure vessel by MMM

- » Designed and manufactured according to the pressure equipment directive 2014/68/EU, AD 2000, and DIN EN 13445
- » Certified to the AD 2000-Merkblatt HP 0 and DIN EN ISO 3834-2 standards
- » Chamber dimensions based on customer specifications
- » Pressure vessel interior (1.4404 / AISI 316L)
- » Pressure vessel exterior (1.4571 / AISI 316Ti)
- » Design pressure at least 3.2 bar, relative (4.5 bar, e.g. BSL3 optionally available)
- » Surface quality:
  - Blasted
  - Smoothed to  $Ra < 0.8 \mu m$  (optional)
  - Electropolished (optional)

## Chamber & sensors with hygienic design

- » Chamber nozzles with hygienic process connectors (DIN 32676 compliant clamp)
- » Nozzles sloped towards chamber (self-draining)
- » Sensors in contact with product equipped with highly temperature-resistant diaphragm seals
- » FDA-compliant seals
- » 3D/6D rule (optional)



## Easy-to-service design

We take the machine's entire lifecycle into consideration right from the development phase. Particularly in the case of extremely durable goods like MMM sterilizers, service and maintenance play an important role in terms of cost and time. That's why we arrange our components so that they are easily accessible, and it's also why we choose software that allows easy maintenance.

### Intelligent device layout

- » Front-side maintenance access
- » Front panel can be opened without being disassembled
- » All sensors feature plug connectors (optional)
- » HMI with piping & instrumentation diagram (optional)
- » Clear visualization of device status (actuators, valves, sensors, pumps, etc.)
- » Anti-pinch protection provided by service door switch
- » Easy to clean



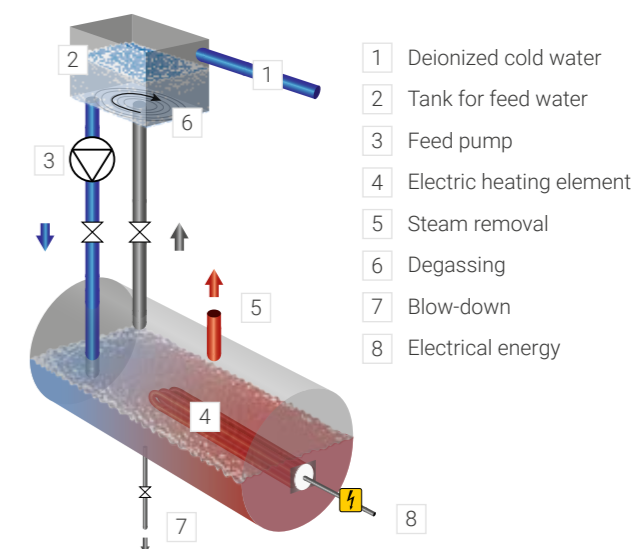
## Pure steam generation

If a supply of pure steam is not available on site, the sterilizer can be operated together with an MMM steam generator. No matter how your facilities are laid out, the steam generator can be integrated into the sterilizer, or can be installed next to, above or away from the steam consumer.

The generator can be conveniently operated from the sterilizer control panel. MMM steam generators are in a class of their own thanks in large part to the high quality of their pure steam and their long service life. They are controlled by thermal degassing and monitored with a temperature probe. Automatic blow-down ensures high-quality boiler water.

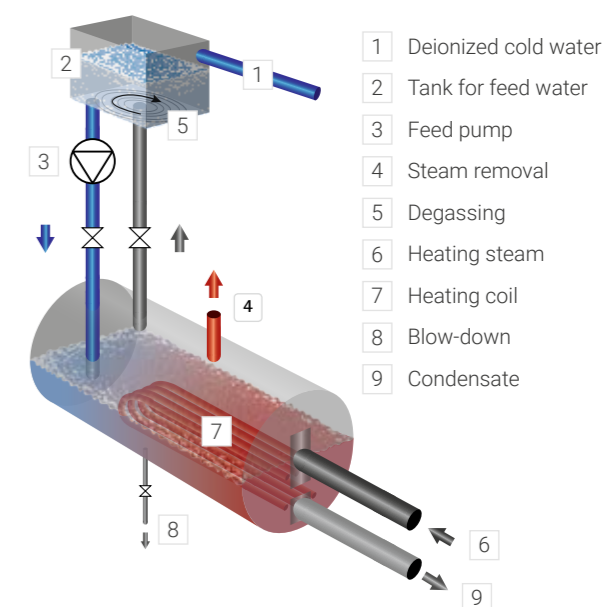
### Unotherm II electric steam generator

The Unotherm II is a low-noise pure steam generator that offers high performance with low energy requirements. It has been specially designed for facilities without a central steam supply. It can also be used for cost-effective steam generation in an emergency or on weekends. The boiler output can be optimized to meet the specific requirements of the connected sterilizer.



### Duotherm II steam-to-steam generator

The Duotherm II also offers the option of converting heating steam to pure steam in facilities with a separate heating steam supply. High performance is guaranteed with optimal sterilization steam, the required steam pressure is reached quickly, and the long service life of the parts means that maintenance costs are kept low. Even if the heating steam pressure is low, the Duotherm II is an ideal steam-to-steam generator: It can be ready for use and supply pure sterilizing steam starting at a heating steam pressure of just 4 bar.







## High-tech – harnessed intelligently

The latest generation of PLC controllers enables intuitive operation, password-protected data management, and parameter-controlled free process programmability that allows all project-specific details to be individually accounted for.

### Precise process control

- » State-of-the-art industrial control
- » Redundant sensors for superior process reliability
- » PPV system: process parameter verification
- » Interfaces for optimal integration

### The software: secure and user-friendly

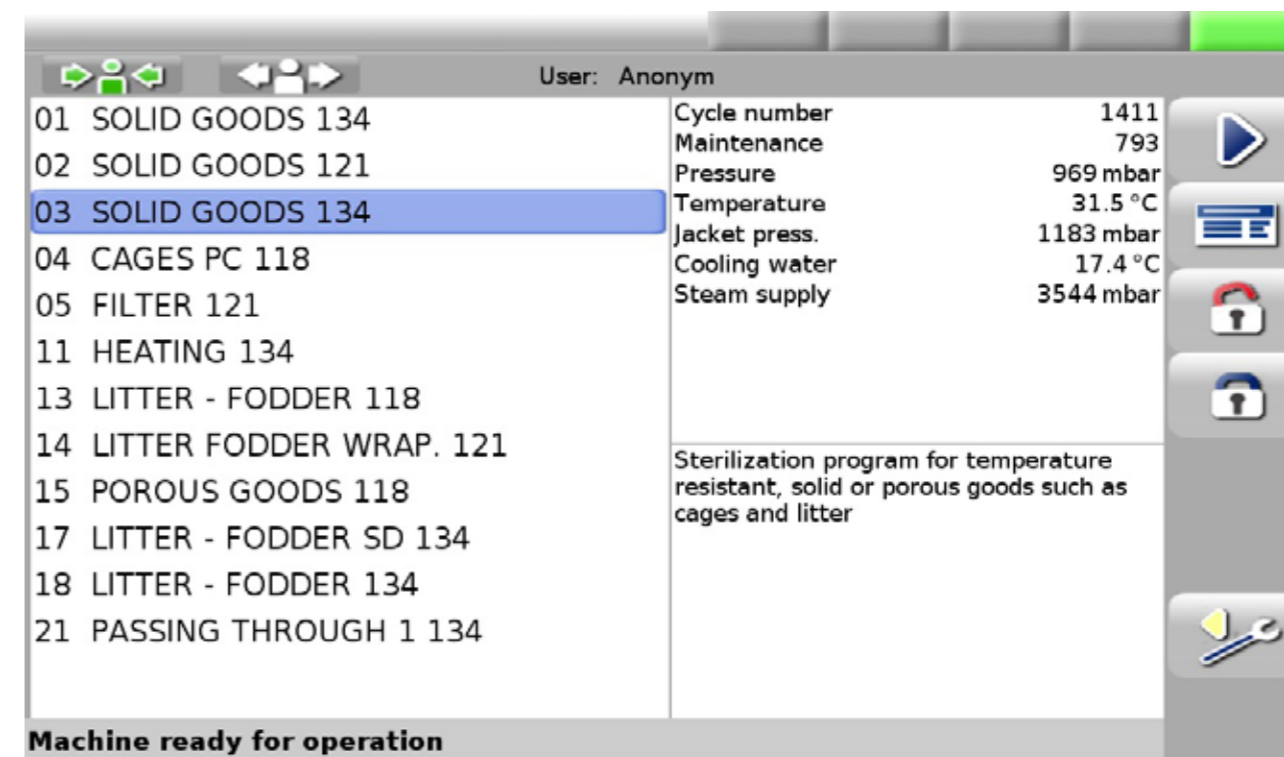
Software is developed and validated in conformity with the DIN EN 62304 standard for software life cycle processes. The sophisticated parameter structure enables highly flexible machine configuration. User management features ensure excellent access security.

### Custom device configuration

- » Continuous monitoring of all measured values
- » Precision actuator control
- » Barcode reading system with automatic program pre-selection (optional)
- » User IDs and user management
- » Autostart for automated program sequences, such as vacuum test, heating (optional)
- » ISA – Intelligent Service Advisor
- » Active piping & instrumentation diagram (optional)

## HMI: modern & intuitive

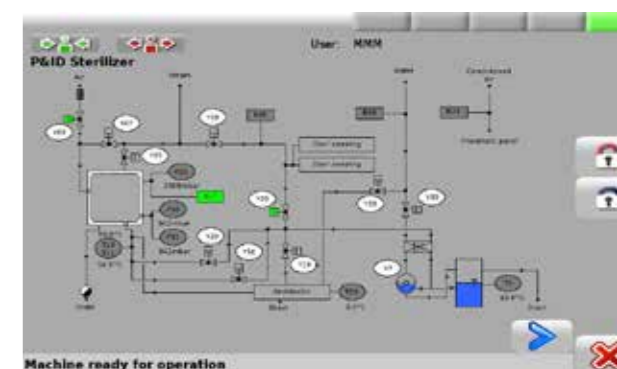
The human/machine interface is just one part of MMM's concept for simplifying the work handled by operating personnel. All process-relevant information—such as the device status, process steps, values, and process graphs—is available at a glance on the display.



Program selection

### Features

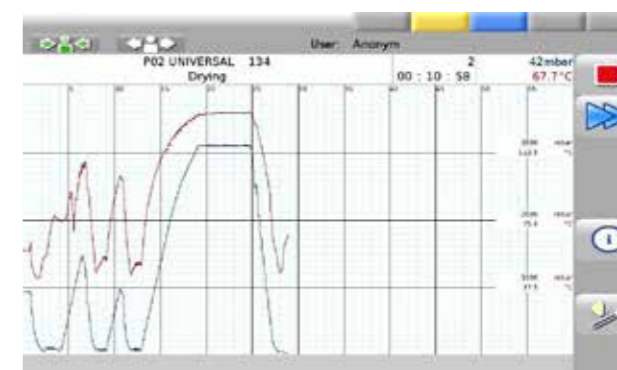
- » Intuitive menu navigation on a color touch-panel display
- » 10" or 15" (optional)
- » Large display for remaining time
- » Easy to clean
- » Active piping & instrumentation diagram (optional)



Piping & instrumentation diagram



Parameter configuration



Program sequence





## Resource management

The MMM sustainability concept helps protect the environment in day-to-day operations. Water is the only substance ever used as a sterilizing medium. To conserve this resource, MMM devices can be equipped with energy and media recovery systems.

MMM also has a DIN EN ISO 14001 environmental management system and a DIN EN ISO 50001 certified energy management system covering both our products and our operating processes.

### Water-saving system

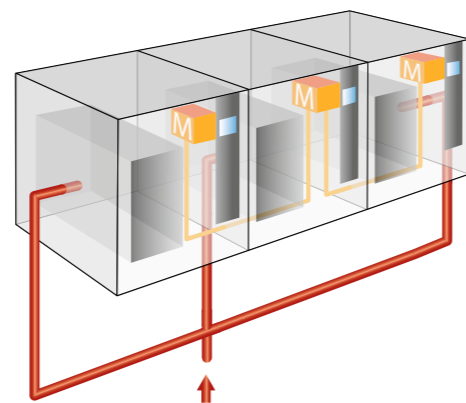
Since it is connected to the on-site cooling circuit, the vacuum pump is cooled using a resource-friendly recirculation method. Fresh water is only added where necessary. The optional media recovery system makes it possible to use up to 95 % less cold water.

### Standby mode & autostart

The control system includes a standby function which activates a power-saving standby mode during longer periods of device inactivity (jacket heating is stopped). It also allows the autostart to be individually programmed for each day, so that the sterilizer can automatically start a defined program sequence (e.g., vacuum test, heating). This provides users with significant time savings.

### Smart steam manager

The optional MMM steam manager controls the chronological program sequence of multiple sterilizers so that the removal of steam from the supply network is distributed as evenly as possible, which in turn prevents peak steam consumption loads. This means that devices can be designed with a lower output and allows investment and media costs to be reduced.



The steam manager can be used with either an external or integrated steam supply.

## Cost-efficient cooling & reduced water usage

For safety reasons, sterilized liquids cannot be removed from the chamber until their temperature falls below 80 °C. Depending on the specific cooling rate requirements, various different methods are available for cooling the liquids.

### Passive cooling – self-cooling

» No cold water used, long cooling times

### Active cooling – jacket cooling

» Temperature-controlled cold water usage, short cooling times

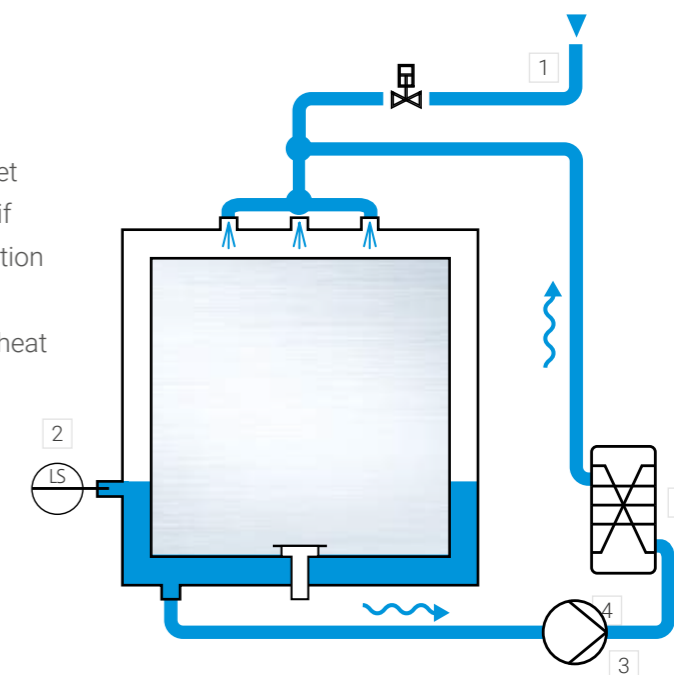
### Recirculation cooling

**90%**  
less water used

**Minimal cooling water usage, short cooling times.**

The amount of water used for jacket cooling can be drastically reduced if the water is re-cooled in a recirculation process. Here, a circulation pump routes used cooling water through a water-cooled heat exchanger, which cools the water again.

- 1 Soft water as cooling medium for jacket
- 2 Level switch
- 3 Circulation pump
- 4 Water-cooled heat exchanger



#### Take advantage of potential savings:

- » **Short batch times:** Active jacket cooling for temperature-sensitive products
- » **Efficient:** Reduce usage of soft water by up to 90 %
- » **Maximum potential savings:** Connect heat exchanger to on-site cooling circuit

### Cooling circuit

You can save even more cold water by connecting both the cooling for the heat exchanger and the condenser cooling for the vacuum device (which is active during the sterilization of solid and porous materials) to an on-site cooling circuit. This will allow you to use up to 95 % less cold water.

**95%**  
less water used

#### Take advantage of potential savings:

- » **Sustainability:** Reduce cold water usage by up to 95 % by connecting to an on-site cooling circuit



# Straightforward process documentation

Batch data is saved in the sterilizer to document the successful completion of a program sequence. The process documentation contains all of the relevant information required for documentation that complies with both standards and customer specifications: the program name, batch number, sterilization temperature, pressure, process start and end times, etc.

## Full data integrity

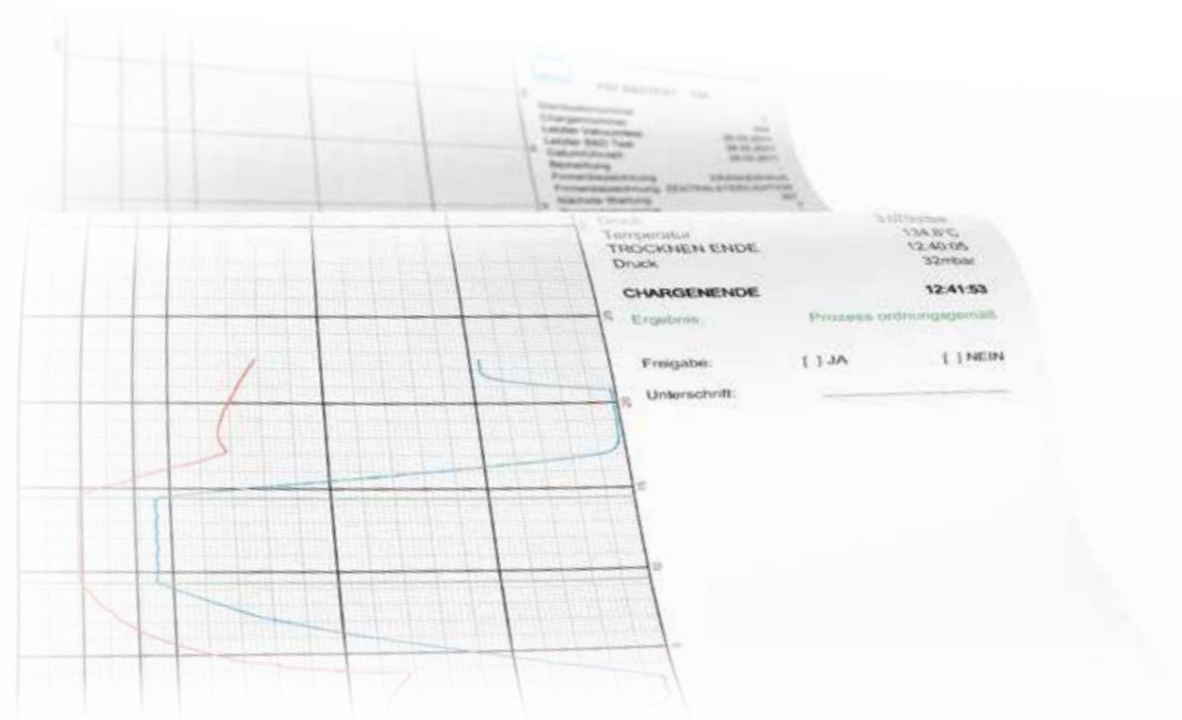
- » Batch and cycle log with plain text and color graph display
- » The batch log can be printed out using the integrated printer or an external DIN A4 color printer
- » Nonvolatile data storage in the controller
- » Optional: SimServ and ChargenViewer

## Safety first

We've developed a special software package for further processing of your batch data: SimServ allows batch data to be saved in a file on an external computer. This data can then be used by the ChargenViewer for various different management levels.

## Available at all times

- » Long-term archiving of batch data as files
- » Can be reprinted any number of times
- » Can be viewed and analyzed at a later date
- » Export to Microsoft® Excel
- » Data can be saved as a PDF file if desired



# ISA – Intelligent Service Advisor

In order to maintain a controlled laboratory workflow, the availability of the lab devices used must be maximized and downtime avoided. MMM steam sterilizers feature an intelligent system that helps minimize device downtime.

The ISA is an optional software program for the MMM sterilizers in your laboratory. It simplifies the communication between humans and machinery. The machine uses the ISA to send a message (an email or text) to the lab staff—or, if desired, MMM Customer Service—notifying them of the machine's current status. The ISA gives staff greater freedom and flexibility to manage workflows.



## Optimized workflow management

Once a program has finished, the user receives a message and can then independently decide when to respond and when to unload and reload the machine.



## Plan service calls ahead of time

Unplanned service calls are costly. Thanks to an integrated maintenance counter, the control system provides advance notification of the next maintenance due. This enables ideal service scheduling while reducing the frequency of undesired machine downtime.







## Hazardous substances: Infectious materials

Stricter safety levels (BSL 2–4) are required wherever pathogenic microorganisms are to be inactivated. Both the condensation produced during this process and the exhaust air are contaminated and must also be treated. To do so, the condensate is collected and subjected to a heat treatment during the inactivation phase. The temperature in the condensate can be monitored to ensure adherence to specific values. In each process, the exhaust air is automatically sterile-filtered by the inline exhaust air filter or undergoes heat treatment.



### Superior process reliability

- » Redundant exhaust air filters (BSL 3–4)
- » Inline exhaust air filter sterilization for each process
- » Thermal air heating (BSL 3–4)
- » Condensate sterilization and inactivation
- » Monitoring of condensate temperature
- » Higher chamber design pressure for inactivation temperature of 143 °C

## Special laboratory & industrial applications

The safety requirements for sterile areas in labs or animal science applications call for individual solutions. MMM sterilizers provide the perfect equipment and the right process for every special application!

### Germ-reduction in heat-sensitive materials

Not everything that passes into a laboratory through an airlock can withstand steam sterilization. To reduce the number of germs, heat-sensitive materials such as computers, microscopes and measuring instruments are treated with hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) when they pass through this point.

The chamber of the MMM sterilizer serves as an airlock and is supplied with hydrogen peroxide by an external H<sub>2</sub>O<sub>2</sub> generator.



### Uncomplicated H<sub>2</sub>O<sub>2</sub> treatment

- » Connection of H<sub>2</sub>O<sub>2</sub> generator for moving heat-sensitive materials through airlocks
- » Simple operation using the sterilizer's HMI
- » Gassing process is monitored
- » High operational reliability thanks to design- and process-specific solutions
- » Compatible with generators from well-known manufacturers



### Waste disinfection according to RKI (Robert Koch Institute)

Infectious waste is produced in many healthcare and research facilities. This waste includes blood, secretions, and excrement (e.g., from hospital isolation units, dialysis units, pathology, etc.) or microbiological cultures (e.g. from institutes for hygiene, microbiology and virology, laboratory medicine, etc.). Contaminated waste that is potentially contagious may only be disposed of after being disinfected using a method approved by the Robert Koch Institute (RKI). Many different MMM sterilizer sizes are included on the RKI List of Disinfectants.

### Infection prevention

- » Safe disposal of infections waste
- » RKI-approved method
- » Suitable for mixed loading







# Vakulab® PL / H

The all-in-one steam sterilizer from MMM.

This machine's equipment options are so wide-ranging and versatile that it covers a particularly broad field of application. Its basic equipment is enough for the sterilizer to satisfy all standard requirements for research laboratories, animal sciences, and industrial applications—both in terms of quality and the range of available chamber volumes.

- » Ergonomic loading height
- » Perfect preparatory and disposal sterilization
- » Diverse equipment options

## Available processes

-  Steam/air mixture process for liquids in closed containers
-  Pre-vacuum process with drying for solid materials
-  Pulsed vacuum process with drying for porous materials
-  Pre-vacuum process with cooling for liquids in open containers

## Features

- » B&R controller
- » 10" or 15" display
- » Active jacket cooling
- » Recirculation cooling and cooling circuit connection
- » ISA – Intelligent Service Advisor
- » Special RKI waste program
- » Exhaust air filtration
- » Condensate inactivation
- » Heat treatment of exhaust air
- » Sterile filtration of compressed air
- » Air detector
- » Air-tight separation
- » Gas-tight separation
- » H<sub>2</sub>O<sub>2</sub> generator connection
- » Fan for steam/air mixture process
- » "Closed solutions" equipment package

(selection of equipment options)



## Size chart

The standard chamber sizes listed below are currently available at MMM. Custom sizes are also available based on individual application specifications. All models are available as a single- or double-door design. For double-door models, add an additional 20 mm to the device depth.

Type	Internal chamber clearance in mm (H x W x D)	Volume in L	Dimensions of device exterior in mm (H x W x D)
<b>H models</b>			
666	710 x 650 x 690	318	1918 x 1900 x 970
669	710 x 650 x 990	456	1918 x 1900 x 1270
966	1000 x 650 x 690	448	1918 x 1900 x 970
969	1000 x 650 x 990	644	1918 x 1900 x 1270
9612	1000 x 650 x 1350	871	1918 x 1900 x 1620

Customer-specific sizes available on request.  
Technical data subject to change without notice.

## Standards

The Vakulab® PL / H is a laboratory sterilizer that meets the requirements of DIN 58951-2.

## Typically treated materials

- » Glass items
- » Cages with bedding
- » Textiles
- » Feed
- » Tubing and hoses
- » Filters
- » Liquids in open or loosely sealed containers
- » Culture media
- » Dispenser bottles
- » Infectious porous materials (BSL 2–4)
- » Infectious liquids (BSL 2-4)









# Vakulab® PL / G

The solution for large-volume items and trolleys.

This machine's equipment options are so wide-ranging and versatile that it covers a particularly broad field of application. Its basic equipment is enough for the sterilizer to satisfy all standard requirements for research laboratories, animal sciences, and industrial applications—both in terms of quality and the range of available chamber volumes.

- » Floor-level loading
- » Perfect preparatory and disposal sterilization
- » Diverse equipment options

## Available processes

-  Steam/air mixture process for liquids in closed containers
-  Pre-vacuum process with drying for solid materials
-  Pulsed vacuum process with drying for porous materials
-  Pre-vacuum process with cooling for liquids in open containers

## Features

- » B&R controller
- » 10" or 15" display
- » Active jacket cooling
- » Recirculation cooling and cooling circuit connection
- » ISA – Intelligent Service Advisor
- » Special RKI waste program
- » Exhaust air filtration
- » Condensate inactivation
- » Heat treatment of exhaust air
- » Sterile filtration of compressed air
- » Air detector
- » Air-tight separation
- » Gas-tight separation
- » H<sub>2</sub>O<sub>2</sub> generator connection
- » Fan for steam/air mixture process
- » "Closed solutions" equipment package

(selection of equipment options)



## Size chart

The standard chamber sizes listed below are currently available at MMM. Custom sizes are also available based on individual application specifications. All models are available as a single- or double-door design. For double-door models, add an additional 20 mm to the device depth.

Type	Internal chamber clearance in mm (H x W x D)	Volume in L	Dimensions of device exterior in mm (H x W x D)
<b>G models</b>			
969	1360 x 720 x 1090	1070	1918 x 1900 x 1390
9612	1360 x 720 x 1390	1360	1918 x 1900 x 1690
12612	1600 x 720 x 1390	1600	2218 x 1900 x 1690
141114	1550 x 1200 x 1500	2770	2150 x 3100 x 2070
181015	2010 x 1100 x 1640	3625	2550 x 3100 x 2210
181215	2010 x 1300 x 1640	4285	2550 x 3500 x 2210

Customer-specific sizes available on request.  
Technical data subject to change without notice.

## Standards

The Vakulab® PL / G is a laboratory sterilizer that meets the requirements of DIN 58951-2.

## Typically treated materials

- » Glass items
- » Cages with bedding
- » Textiles
- » Feed
- » Tubing and hoses
- » Filters
- » Liquids in open or loosely sealed containers
- » Culture media
- » Dispenser bottles
- » Infectious porous materials (BSL 2–4)
- » Infectious liquids (BSL 2-4)








# Vakulab® PL Compact Line

High-grade sterilization technology with a small footprint.

The solid and compact design, sophisticated technology and modular structure of this device are very user-friendly and particularly easy to service.

- » Machine width of 995 mm
- » Smart HMI 10" / 16:9
- » Water-saving vacuum unit
- » LED chamber lighting

## Available processes

-  Pre-vacuum process with drying for solid materials
-  Pulsed vacuum process with drying for porous materials
-  Pre-vacuum process with cooling for liquids in open containers

## Features

- » B&R controller
- » 10" display on loading side
- » 7" display on unloading side
- » Active jacket cooling
- » LED chamber lighting
- » Front-side service access
- » ISA – Intelligent Service Advisor
- » Special RKI waste program
- » Exhaust air filtration
- » Condensate inactivation
- » Sterile filtration of compressed air
- » Integrated pure steam generator

(selection of equipment options)



## Size chart

The standard chamber sizes listed below are currently available at MMM. Custom sizes are also available based on individual application specifications. All models are available as a single- or double-door design. For double-door models, add an additional 20 mm to the device depth.

Type	Internal chamber clearance in mm (H x W x D)	Volume in L	Dimensions of device exterior in mm (H x W x D)
636	670 x 360 x 700	160	2400 x 795 x 990
666	702 x 652 x 690	314	2400 x 995 x 990
669	702 x 652 x 990	453	2400 x 995 x 1290
6612	702 x 652 x 1340	610	2400 x 995 x 1640

Technical data subject to change without notice.

## Standards

The Vakulab® PL Compact Line is a laboratory sterilizer that meets the requirements of DIN 58951-2.

## Typically treated materials

- » Glass items
- » Cages with bedding
- » Textiles
- » Feed
- » Tubing and hoses
- » Filters
- » Liquids in open or loosely sealed containers
- » Culture media
- » Dispenser bottles
- » Infectious porous materials
- » Infectious liquids









# Ventilab® PL

The specialist for steam/air mixture processes.

The main differences between this machine and the Vakulab PL are the higher chamber that allows a fan to be built in without reducing the chamber volume. In addition, all of the equipment components necessary for sterilizing liquids in closed containers, such as a temperature probe, chamber wall, fan, and the "Closed solutions" software package, are already included as a standard feature.

- » Fan with magnetic coupling
- » No reduction in chamber volume despite fan
- » High Pathogen program

## Available processes

-  Steam/air mixture process for liquids in closed containers
-  Pre-vacuum process with drying for solid materials
-  Pulsed vacuum process with drying for porous materials
-  Pre-vacuum process with cooling for liquids in open containers

## Features

- » B&R controller
- » 10" or 15" display
- » Active jacket cooling
- » Recirculation cooling and cooling circuit connection
- » ISA – Intelligent Service Advisor
- » Special RKI waste program
- » Exhaust air filtration
- » Condensate inactivation
- » Heat treatment of exhaust air
- » Sterile filtration of compressed air
- » Air detector
- » Air-tight separation
- » Gas-tight separation
- » H<sub>2</sub>O<sub>2</sub> generator connection
- » Fan for steam/air mixture process
- » "Closed solutions" equipment package

(selection of equipment options)



## Standards

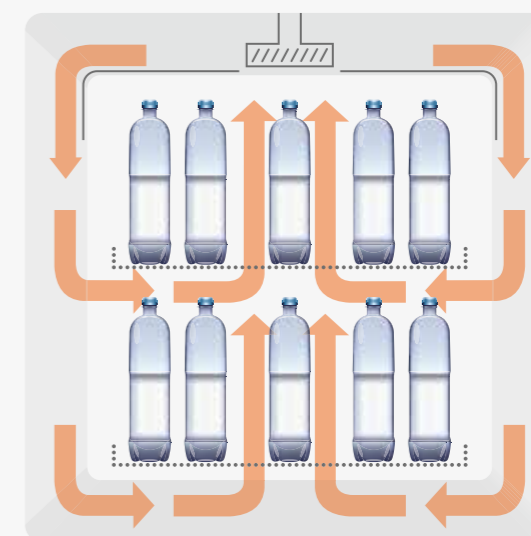
The Ventilab® PL is a laboratory sterilizer that meets the requirements of DIN 58951-2

## Size chart

The standard chamber sizes listed below are currently available at MMM. Custom sizes are also available based on individual application specifications. All models are available as a single- or double-door design. For double-door models, add an additional 20 mm to the device depth.

Type	Internal chamber clearance in mm (H x W x D)	Volume in L	Dimensions of device exterior in mm (H x W x D)
<b>H models</b>			
669	830 x 650 x 990	521	1898 x 1600 x 1270
969	1130 x 650 x 990	708	1898 x 1600 x 1270

Customer-specific sizes available on request. Technical data subject to change without notice.



Steam/air mixture process

## Typically treated materials

- » Liquids in closed containers
- » Liquids in open and loosely sealed containers
- » Glass items
- » Animal cages and dispenser bottles
- » Textiles
- » Bedding
- » Feed & feed bags
- » Tubing and hoses
- » Filters
- » Culture media



# Overview of MMM sterilizers

Technical features	Vakulab® PL	Vakulab® PL CL	Ventilab® PL
<b>Directives, standards, guidelines, and regulations</b>			
PED 2014/68/EU, MD 2006/42/EC, DIN 58951	●	●	●
<b>Mechanical design</b>			
Chamber inner jacket material (1.4404 / AISI 316L)	●	●	●
Chamber inner surface blasted	●	/	●
Chamber inner surface smoothed to Ra < 1.2 µm	/	●	/
Chamber inner surface smoothed to Ra < 0.8 µm	○	○	○
Chamber inner surface electropolished	○	/	○
Hygienic design – chamber & sensors	○	/	○
Air-tight separation	○	/	○
<b>Pipes</b>			
CNS – piping	○	●	○
Insulation with aluminum-laminated mineral wool	○	/	○
<b>Cooling</b>			
Self-cooling (passive cooling)	○	●	○
Jacket cooling (active cooling)	●	○	●
Recirculation cooling (active cooling)	○	/	○
Cooling circuit connection	○	/	○
<b>Control &amp; software</b>			
PLC controller + 10" or 15" control panel (optional)	●	/	●
PLC controller + 7" and 10" control panel	/	●	/
Active piping & instrumentation diagram	/	●	/
Remote maintenance system	○	○	○
<b>Sterilization process &amp; additional programs</b>			
"Closed solutions" equipment package	○	/	●
"Vacuum programs" equipment package	●	●	●
Fan	○	/	●
Inline compressed air filter sterilization	○	/	○
Temperature monitoring for condensate sterilization	○	/	○
Autostart & standby mode program	○	○	○
H <sub>2</sub> O <sub>2</sub> connection	○	/	○
Air detector	○	/	○
RKI-approved 134 °C waste program	○	/	○
<b>Process technology components</b>			
Internal vacuum equipment	●	●	●
External vacuum equipment	○	/	○
Compressed air filter	○	○	○
Exhaust air filter	○	○	○
Connection for filter integrity test	○	/	○
<b>Steam supply</b>			
Electric steam generator / steam-to-steam generator	○	/	○
Integrated electric steam generator	/	●	/
Steam manager	○	/	○
<b>Technical documentation</b>			
Standard device documentation	●	●	●
Enhanced device documentation	○	/	○
<b>Factory acceptance test &amp; qualification</b>			
Standard FAT	○	○	○
IQ, OQ, PQ laboratory	○	○	○
<b>Batch documentation</b>			
A4 log	●	●	●
SimServ – external batch documentation	○	○	○
Thermoplotter	○	○	○
BatchViewer	○	○	○

● = standard ○ = optional / = on request (subject to change)



## Customer service: Reliable & effective

Our knowledgeable service organization is here for you around the clock to help ensure continuous, trouble-free operation of your installed systems. With branches and representative offices located for optimal coverage throughout Europe, we're always close by and can quickly arrive on-site in case of an emergency.

The sophisticated and innovative design of our systems and devices allow functional impairments to be resolved in little time in many cases, thanks to remote diagnostics performed by qualified personnel. Based on our professional maintenance planning, we can guarantee you the highest possible availability of your systems.

However, our goal is to prevent any problems from arising in the first place. We won't hand over our systems to you until everything is running flawlessly, until all programs have been tested/validated and accepted in accordance with your individual customer specifications, and until operating personnel have been trained to use our systems.

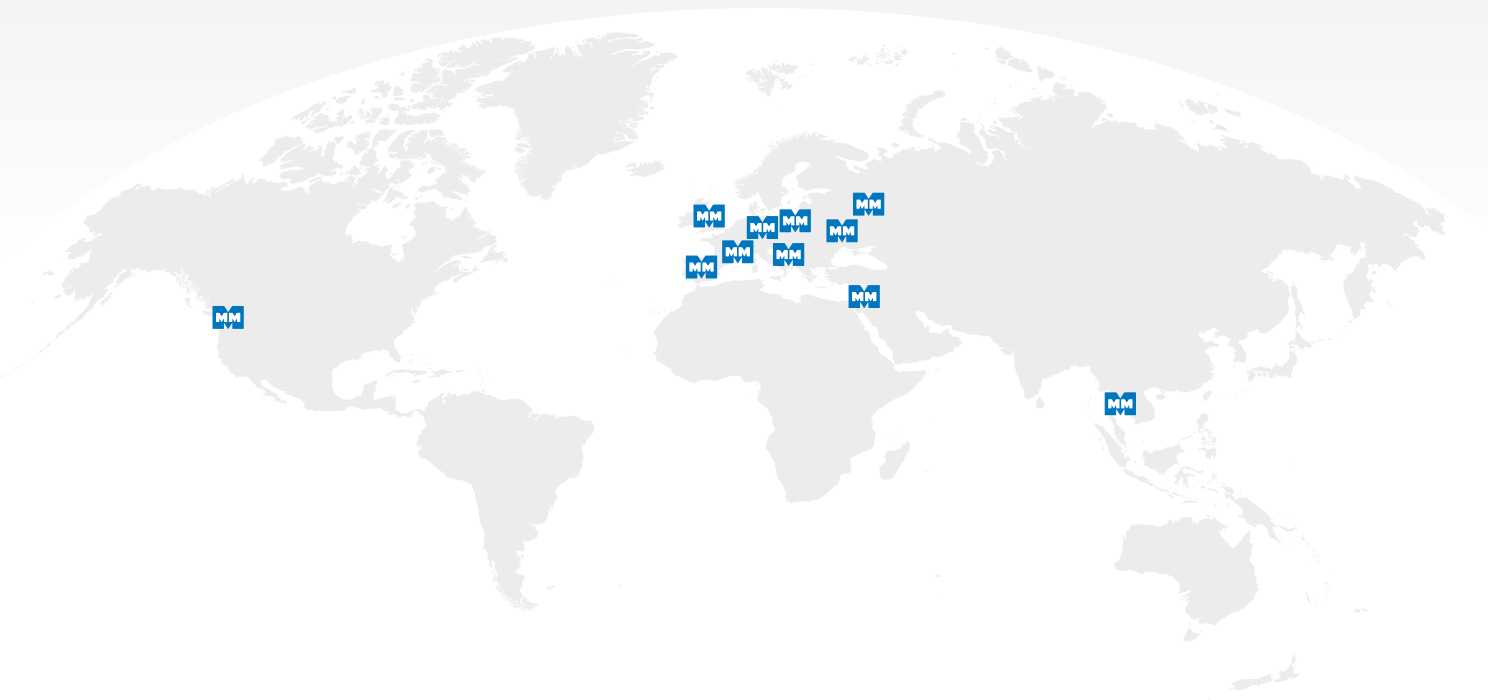
In addition to performing maintenance and repair, we also make sure that the installed systems are up-to-date. Tailor-made solutions for adapting to changing conditions, optimizing the use of consumables, and continuously meeting new individual needs and legal requirements increase the service life and cost-effectiveness of the systems and secure the value of your investment.

### Services

- » Maintenance planning
- » Inspection and service
- » Repair
- » 24-hour hotline
- » Spare parts logistics – 24-hour service
- » Upgrade service
- » Process validation
- » Initial & advanced training



MMM. Subsidiaries worldwide.



Healthcare

Life Science

Customer Service



## MMM Group

MMM has been operating worldwide as one of the leading system providers in service of health since 1954. With a complete range of products and services relating to all aspects of cleaning, disinfection and sterilization systems for the fields of Healthcare and Life Science, MMM has positioned itself as a major driver of quality and innovation in both the German and international markets. Our products are

individually adapted to the requirements of our customers all over the world. The high vertical range of manufacturing in our production plants ensures that we fulfill the most stringent demands for quality in the medical technology industry. More than 1100 employees apply their expertise and dedication to the mission of the MMM Group: **Protecting human health.**



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