# AUTOCLAVES
## - SYSTEC DX-SERIES
## - SYSTEC VX SERIES
## - SYSTEC HX-SERIES

New Generation

**Systec**
the autoclave company

MADE IN GERMANY

ISO 9001
ISO14001

All INFORMATION ABOUT YOUR SYSTEC AUTOCLAVES AT A GLANCE!

SYSTEC CONNECT

IEC 61010

DIN 58950

Safety for laboratory equipment

Steam sterilizers for pharmaceutical Sterilized goods

Systec DX-Series. Horizontal table-top autoclaves
Systec VX-Series. Vertical floor-standing autoclaves.
Systec HX-Series. Large horizontal autoclaves.
Systec HX-Series 2D. Pass-through autoclaves.

# SYSTEC - THE AUTOCLAVE COMPANY

## CONTENT

www.systec-lab.de

# PERFORMANCE AND EXPERTISE

Performance through experience and innovation



We focus on two things. Laboratory autoclaves. and devices for better sterilization and handling of culture media. Always with the aim of making laboratory work safer, simpler, more accurate, reproducible and validatable and therefore more economical and ecological. From more than 30 years of experience and permanent, intensive cooperation with practitioners, we know how even complex sterilization processes can be carried out optimally. Place your trust in quality, certified to ISO 9001, and in the responsible use of resources and the environment, certified to ISO 14001.

**We have the expertise for optimum results!**
**With specialized local partners, our services are available to you worldwide.**

Management System
ISO 9001:2015
ISO 14001:2015
www.tuv.com
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TÜVRheinland®
ZERTIFIZIERT

ISO 9001
ISO14001

# THE POWER OF INNOVATION FOR BETTER STERILIZATION



## Systec laboratory autoclaves

Developed for the special sterilization tasks in the laboratory, Systec laboratory autoclaves make processes safer, simpler, more precise, reproducible and validatable.

Systec autoclaves are suitable for all laboratory applications, even the most demanding sterilization processes.

**STERILIZATION OF:**

💧 **Liquids** (e.g. nutrient media, culture media),

🧫 **Solids** (e.g. instruments, pipettes, glassware),

🗑 **Waste** (sterilization of liquid waste in bottles or solid waste in destruction bags)

☣ **Biological hazardous substances in safety laboratories.**

# REVOLUTIONARY AUTOCLAVES

## Systec DX-Series, Systec VX-Series and Systec HX-Series.

The realization of an optimal workflow becomes reality with the latest autoclaves of the Systec DX-Series, Systec VX-Series and Systec HX-Series. State-of-the-art software solutions, combined with a wide range of options and accessories, enable an even more efficient and cost-saving workflow, ensuring maximum convenience, fast sterilization times with low resource consumption and seamless documentation. Our autoclaves therefore optimize the entire steam sterilization workflow, from sterilization to documentation. With our solutions, you not only achieve your environmental goals, but also increase the cost-effectiveness and efficiency of your laboratory work.

For all laboratory applications, even for demanding state-of-the-art sterilization processes. With all options for optimizing your processes to achieve validatable sterilization processes.

Maximum Efficiency for your laboratory

# THE ADVANTAGES OF SYSTEC AUTOCLAVES

Microprocessor controlled

Touchscreen

Internal Memory

AISI 316 TI  Stainless steel

140 °C sterilization-temperature*

4 bar Pressure**

\*  optionally extendable to 150 °C
\*\* optionally extendable to 5 bar

## Faster and better process in the laboratory

- In accordance with the highest safety and precision requirements for reproducible and validatable sterilization processes
- Sterilization temperature up to 140 °C, steam pressure 4 bar absolute pressure (optional 150 °C / 5 bar absolute pressure)
- Fully automatic process sequence via state-of-the-art microprocessor control
- User-friendly touch-screen control
- Up to 100 configurable programs for a wide range of sterilization tasks.

## Speed and efficiency

- Optimized heating and cooling times enable faster work processes
- Reduced waiting times between sterilization cycles
- Optimized loading capacities for optimal use of the available chamber volume

## Conserves energy and resources

- Innovative insulating materials to reduce heat loss
- Energy-efficient heating and cooling systems for faster process times while reducing resource consumption
- Solutions for paperless processing and documentation of all relevant process data

## Networked and independent with "Systec Connect"

- Systec Conncet offers state-of-the-art solutions for working with process data generated by the autoclave
- Use the free Systec Connect app (for iOS and Android) to obtain real-time information about your autoclaves
- Systec Connect USB allows to download the process documentation from your autoclave via USB stick
- Systec Connect DS (Documentation System) allows extensive access to the process data generated by your autoclaves. No software installation is required to use Systec Connect DS and it can be used on any end device such as a mobile phone, tablet or stationary computer
- Or have your process data conveniently sent to you automatically after each sterilization cycle via Systec Connect STF (Save To Folder)
- Would you like to integrate your autoclaves into an existing LIMS or SCADA application? Systec Connetc OPC-UA offers the solution for this
- Data security is the top priority: no internet or cloud connection is required to use the Systec Connect solutions

## Less electricity and water consumption

- Low energy consumption thanks to innovative technology
- Water-saving cycle options to minimize water consumption
- Long-term cost reduction through reduced consumption of important resources such as electricity and water

# SYSTEC DX-SERIES
# THE HORIZONTAL TABLE-TOP AUTOCLAVES

## Plenty of space. Many advantages.

The Systec DX-Series, consisting of horizontal table-top autoclaves that are loaded from the front and is characterized by its space-saving design with generous usable space at the same time. One outstanding advantage is the optimum loading capacity for a large number of standard medium bottles and Erlenmeyer flasks, which ensures optimum utilization of the usable space and thus an optimal loading capacity.

The autoclaves of Systec DX-Series cover a wide range of applications in laboratories in various industries, educational institutions and research facilities. Their main objective is to increase laboratory productivity. Thanks to generous chamber volumes, shortened process times and numerous additional options, they enable optimum use of water, electricity and operating time.

**Shorter and more efficient process times**
thanks to the completely newly developed control of the autoclaves.

**7 models from 25 to 200 l usable volume**

Systec DX-25   Systec DX-40   Systec DX-65   Systec DX-90   Systec DX-100   Systec DX-150   Systec DX-200

### Dimensions and performance

| Systec | DX-25 | DX-40 | DX-65 | DX-90 | DX-100 | DX-150 | DX-200 |
|---|---|---|---|---|---|---|---|
| Useable dimensions Ø x depth (mm) | 320 x 315 | 320 x 500 | 400 x 500 | 400 x 700 | 500 x 500 | 500 x 750 | 500 x 1000 |
| Usable volume (l) total / nominal | 30 / 25 | 45 / 40 | 70 / 65 | 95 / 90 | 113 / 100 | 162 / 150 | 211 / 200 |
| Net weight (kg) | 105 | 125 | 125 | 145 | 165 | 190 | 210 |
| Heat capacity(kW) | 3.5 | 3.5 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |

Systec DX-25 and Systec DX-40: Voltage 220 - 240 V, 50/60 Hz, 16A
Systec DX-65 to Systec DX-200: Voltage 380 - 400 V, 50/60 Hz, 16A
Other power supplies available on request.
Country-specific deviations possible.

### Loading capacity* Erlenmeyer flask

| Systec | DX-25 | DX-40 | DX-65 | DX-90 | DX-100 | DX-150 | DX-200 |
|---|---|---|---|---|---|---|---|
| 250 ml | 9 | 15 | 23 | 31 | 2 x 30 | 2 x 42 | 2 x 59 |
| 500 ml | 6 | 9 | 15 | 21 | 2 x 15 | 2 x 24 | 2 x 40 |
| 1000 ml | 4 | 6 | 9 | 13 | 12 | 18 | 23 |
| 2000 ml | 2 | 3 | 6 | 8 | 7 | 9 | 14 |
| 3000 ml | 0 | 0 | 3 | 4 | 6 | 8 | 11 |
| 5000 ml | 0 | 0 | 0 | 0 | 3 | 5 | 7 |

### Loading capacity* DURAN® laboratory flask (Schott)

| Systec | DX-25 | DX-40 | DX-65 | DX-90 | DX-100 | DX-150 | DX-200 |
|---|---|---|---|---|---|---|---|
| 250 ml | 11 | 17 | 31 | 40 | 2 x 36 | 2 x 54 | 2 x 83 |
| 500 ml | 8 | 14 | 23 | 31 | 2 x 26 | 2 x 40 | 2 x 59 |
| 1000 ml | 6 | 10 | 15 | 18 | 18 | 26 | 40 |
| 2000 ml | 2 | 4 | 8 | 10 | 12 | 14 | 23 |
| 5000 ml | 0 | 0 | 2 | 4 | 6 | 8 | 11 |
| 10000 ml | 0 | 0 | 0 | 0 | 2 | 3 | 4 |

* At maximum load, partially without baskets
Loading capacities may vary slightly depending on the operation and due to different sizes of flasks or flasks.

# SYSTEC VX-SERIES
# THE VERTICAL STAND AUTOCLAVES

## Plenty of space. Many advantages.

The Systec VX-Series, consisting of vertical floor-standing autoclaves that are loaded from top, is characterized by its space-saving design and generous usable height. One outstanding advantage is the optimum loading capacity for standard-medium bottles and Erlenmeyer flasks, enabling an increase in loading capacity of up to 50 %.

The autoclaves in the Systec VX-Series cover a wide range of applications in laboratories in various industries, educational institutions and research facilities. Their main objective is to increase laboratory productivity. Thanks to generous chamber volumes, shortened process times and numerous additional options, they enable optimum use of water, electricity and operating time.

**Shorter and more efficient process times**
thanks to the completely newl developed control of the autoclaves.

**7 models from 40 to 150 l usable volume**

Systec VX-40   Systec VX-55   Systec VX-65   Systec VX-75   Systec VX-95   Systec VX-100   Systec VX-120   Systec VX-150

### Dimensions and performance

| Systec | VX-40 | VX-55 | VX-65 | VX-75 | VX-95 | VX-100 | VX-120 | VX-150 |
|---|---|---|---|---|---|---|---|---|
| Useable dimensions Ø x depth (mm) | 400 x 320 | 400 x 400 | 400 x 500 | 400 x 600 | 400 x 750 | 500 x 500 | 500 x 600 | 500 x 750 |
| Usable volume (l) total / nominal | 51 / 40 | 59 / 55 | 73 / 65 | 85 / 75 | 104 / 95 | 117 / 100 | 137 / 120 | 166 / 150 |
| Net weight (kg) | 130 | 140 | 145 | 150 | 160 | 190 | 195 | 205 |
| Heat capacity (kW) | 3.5 | 3.5 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |

Systec VX-40 and Systec VX-55: Voltage 220 - 240 V, 50/60 Hz, 16A
Systec VX-65 to Systec VX-150: Voltage 380 - 400 V, 50/60 Hz, 16A
Other power supplies available on request.
Country-specific deviations possible.

### Loading capacity Erlenmeyer flask in baskets

| Systec | VX-40 | VX-55 | VX-65 | VX-75 | VX-95 | VX-100 | VX-120 | VX-150 |
|---|---|---|---|---|---|---|---|---|
| 250 ml | 1 x 13 | 2 x 13 | 2 x 13 | 2 x 13 | 3 x 13 | 3 x 22 | 3 x 22 | 3 x 22 |
| 500 ml | 1 x 8 | 2 x 8 | 2 x 8 | 2 x 8 | 3 x 8 | 3 x 14 | 3 x 14 | 3 x 14 |
| 1000 ml | 1 x 5 | 1 x 5 | 2 x 5 | 2 x 5 | 3 x 5 | 2 x 8 | 2 x 8 | 3 x 8 |
| 2000 ml | 0 | 1 x 3 | 1 x 3 | 1 x 3 | 2 x 3 | 2 x 5 | 2 x 5 | 2 x 5 |
| 5000 ml | 0 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 |

### Loading capacity* DURAN® laboratory flask (Schott) in baskets

| Systec | VX-40 | VX-55 | VX-65 | VX-75 | VX-95 | VX-100 | VX-120 | VX-150 |
|---|---|---|---|---|---|---|---|---|
| 250 ml | 1 x 20 | 2 x 20 | 2 x 20 | 2 x 20 | 3 x 20 | 3 x 34 | 3 x 34 | 3 x 34 |
| 500 ml | 1 x 13 | 2 x 13 | 2 x 13 | 2 x 13 | 3 x 13 | 3 x 21 | 3 x 21 | 3 x 21 |
| 1000 ml | 1 x 8 | 1 x 8 | 2 x 8 | 2 x 8 | 3 x 8 | 2 x 15 | 2 x 15 | 3 x 15 |
| 2000 ml | 1 x 4 | 1 x 4 | 1 x 4 | 2 x 4 | 2 x 4 | 2 x 8 | 2 x 8 | 2 x 8 |
| 5000 ml | 0 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 | 1 x 1 |

\* At maximum load, partially without baskets
Loading capacities may vary slightly depending on the options and due to different sizes of flasks or flasks.

# SYSTEC HX-SERIES
# THE HORIZONTAL STAND AUTOCLAVES

Autoclaves for all laboratory applications, even for demanding sterilization processes.

The Systec HX-Series is a series of horizontal floor-standing autoclaves ranging from smaller loading volumes from 65 liters to large volumes of up to 1580 liters. 16 different models are available to realize the optimum loading volume for you. The Systec HX-Series is characterized by extreme flexibility and efficiency, for example in the adaptation of loading systems to your loading situation and the resulting optimal use of the available usable volume. Despite the high load volume, these appliances are compact and comparatively lightweight. Systec HX-Series autoclaves are designed so that they are as easy as possible to install and can be put into operation with minimal installation effort.

**Shorter and more efficient process times** thanks to the completely new developed control of the autoclaves.

**16 models from 65 to 1580 l usable volume**

**OPTIONAL:** Stainless steel cladding

## Dimensions and performance

| Systec | HX-65 | HX-90 | HX-100 | HX-150 | HX-200 |
|---|---|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 400 x 750 | 500 x 750 | 500 x 500 | 500 x 750 | 500 x 1000 |
| Usable volume (l) total / nominal | 70 / 65 | 105 / 90 | 115 / 100 | 165 / 150 | 215 / 200 |
| Heat capacity (kW) | 9,0 | 9,0 | 9,0 | 9,0 | 9,0 |

| Systec | HX-210 | HX-320 | HX-430 | HX-540 | HX-650 |
|---|---|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 740 x 500 | 740 x 750 | 740 x 1000 | 740 x 1250 | 740 x 1500 |
| Usable volume (l) total / nominal | 280 / 210 | 385 / 320 | 495 / 430 | 600 / 540 | 710 / 650 |
| Heat capacity (kW) | 18,0 | 18,0 | 18,0 | 18,0 | 18,0 |

| Systec | HX-580 | HX-780 | HX-980 | HX-1180 | HX-1380 | HX-1580 |
|---|---|---|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 1000 / 750 | 1000 X 1000 | 1000 x 1250 | 1000 x 1500 | 1000 x 1750 | 1000 x 2000 |
| Usable volume (l) total / nominal | 735 / 580 | 930 / 780 | 1130 / 980 | 1325 / 1180 | 1520 / 1380 | 1715 / 1580 |
| Heat capacity (kW) | 36,0 | 36,0 | 36,0 | 36,0 | 36,0 | 36,0 |

Electrical connection for Systec HX-65 to Systec HX-200: 380 - 400 V, 50 / 60 Hz, 16 A.
Electrical connection for Systec HX-210 to Systec HX-650: 380 - 400 V, 50 / 60 Hz, 32 A.
Electrical connection for Systec HX-580 to Systec HX-1580: 380 - 400 V, 50 / 60 Hz, 63 A.
Other power supplies available on request.

# SYSTEC HX-SERIES 2D
# THE PASS-THROUGH AUTOCLAVES

## For the highest safety in cleanrooms and biological safety laboratories

- For biological safety laboratories. Installation as a sterilization and pass-through airlock to protect the outer environment.
- For cleanrooms. Installation as a sterilization and pass-through airlock to reliably maintain cleanroom conditions by separating clean and unclean areas.

**Triple safety**

- Only one door can be opened at a time. If one door is open, the other remains automatically locked.
- If the autoclave is switched off or without power (e.g. in the event of a power failure), both doors are locked.
- After opening the door on the unclean side, a sterilization program must always run before the door on the clean side can be opened can be opened.

Dimensions and performance

| Systec | HX-90 2D | HX-150 2D | HX-200 2D |
|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 400 x 750 | 500 x 750 | 500 x 1000 |
| Usable volume (l) total / nominal | 100 / 90 | 160 / 150 | 210 / 200 |
| Heat capacity (kW) | 9,0 | 9,0 | 9,0 |

**Shorter and more efficient process times** thanks to the completely new developed control of the autoclaves.

| Systec | HX-320 2D | HX-430 2D | HX-540 2D | HX-650 2D |
|---|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 740 x 750 | 740 x 1000 | 740 x 1250 | 740 x 1500 |
| Usable volume (l) total / nominal | 375 / 320 | 485 / 430 | 590 / 540 | 700 / 650 |
| Heat capacity (kW) | 18,0 | 18,0 | 18,0 | 18,0 |

| Systec | HX-580 2D | HX-780 2D | HX-980 2D | HX-1180 2D | HX-1380 2D | HX-1580 2D |
|---|---|---|---|---|---|---|
| Useful dimensions Ø x depth (mm) | 1000 x 750 | 1000 x 1000 | 1000 x 1250 | 1000 x 1500 | 1000 x 1750 | 1000 x 2000 |
| Usable volume (l) total / nominal | 680 / 580 | 880 / 780 | 1075 / 980 | 1270 / 1180 | 1465 / 1380 | 1665 / 1580 |
| Heat output (kW) | 36,0 | 36,0 | 36,0 | 36,0 | 36,0 | 36,0 |

**13 Models from 90 to 1580 l usable space**

**OPTIONAL:** Stainless steel cladding

Electrical connection for Systec HX-90 2D to Systec HX-200 2D: 380 - 400 V, 50 / 60 Hz, 16 A.
Electrical connection for Systec HX-320 2D to Systec HX-650 2D: 380 - 400 V, 50 / 60 Hz, 32 A.
Electrical connection for Systec HX-580 2D to Systec  HX-1580 2D: 380 - 400 V, 50 / 60 Hz, 63 A.
Other power supplies available on request.

# SYSTEC AUTOCLAVES
# AVAILABLE IN DIFFERENT CHAMBER
# DIMENSIONS

Available in five chamber sizes with diameters of 300 mm, 400 mm, 500 mm, 740 mm and 1000 mm.  The loading volume of the diameter of 1000 mm corresponds to the loading volume of an autoclave with a square chamber measuring 600 mm x 600 mm.
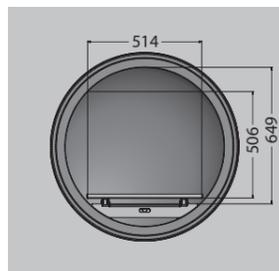


Diameter 740 mm
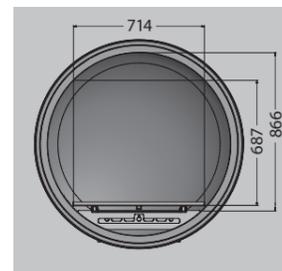


Diameter 1000 mm

| ⭐ Standard features | |
|---|---|
| Integrated steam generator separate from the chamber | ◾ |
| Housing, support frame and pressure vessel made of corrosion-resistant stainless steel | ◾ |
| Temperature and pressure range 140 °C, 4 bar absolute pressure | ◾ |
| Pressure vessel made of pharmaceutical stainless steel 316L (1.4404) | ◾ |
| Systec Connect APP for iOS and Android devices | ◾ |
| Touch screen control | ◾ |
| Up to 100 sterilization programs, freely configurable | ◾ |
| User control (standard). Three preset and fixed groups, each with one user (administrator, operator, supervisor), are available in the standard user control | ◾ |
| Free text input for batch information | ◾ |
| Internal memory for backing up process data for at least 10 years | ◾ |
| Systec Connect USB, batch documentation and export as PDF and CSV (Excel file) via integrated USB interface | ◾ |
| Ethernet network connection | ◾ |
| Time synchronization with time server via network or Internet | ◾ |
| Timer for programmable start time | ◾ |
| Adjustable automatic door opening at the end of the program | ◾ |
| F0 value calculation | ◾ |
| Special program for destruction sterilization with fractionated heating for more efficient deaeration | ◾ |
| Special program for Durham tubes | ◾ |
| Flexible PT-100 class A temperature sensor | ◾ |
| Additional temperature sensor in the condensate outlet | ◾ |
| Validation port for the integration of external measuring equipment | ◾ |
| Water-cooled, thermostatically controlled waste water temperature control | ◾ |

| ➕ Options for process optimization | |
|---|---|
| Rapid re-cooling for efficient and safe cooling of liquids | ☐ |
| Radial ventilator and Ultracooler to speed up the cooling process | ☐ |
| Spray cooling using hot water and soft water spray | ☐ |
| Steam-air mixture process: Support pressure during the heating, sterilization and cooling phases. Particularly suitable for closed containers at risk of bursting or deformation | ☐ |
| Vacuum system for the validatable sterilization of solids and waste in destruction bags | ☐ |
| Superdry, for drying solids | ☐ |
| Exhaust air filtration (including condensate activation) for the safe sterilization of hazardous biological substances | ☐ |

| ➕ Options for documentation | |
|---|---|
| Integrated printer for batch documentation | ☐ |
| Systec Connect WIFI for wireless integration of the autoclaves into a network | ☐ |
| Systec Connect DS (Documentation System) for comprehensive access to all process data | ☐ |
| Systec Connect STF (Save to Folder) - Automatic data transfer via FTP/SFTP | ☐ |
| Systec Connect OPC/UA for integrating the autoclaves into external software (e.g. LIMS or SCADA) | ☐ |

| ➕ Further options | |
|---|---|
| Extension of the temperature and pressure range to 150 °C/ 5 bar absolute pressure | ☐ |
| All fittings and valves in the supply lines (from the media connection to the sterilization chamber) for demineralized water, steam and compressed air made of stainless steel, all piping made of FDA-certified PTFE | ☐ |
| External steam heating, for connection to an in-house steam supply | ☐ |
| Combined heating: Combined heating supplements the integrated steam generator with the option of heating with external steam | ☐ |
| Connection to an open or closed cooling circuit | ☐ |
| Keep warm function for liquids at the end of the program | ☐ |
| Potential-free contact (one or more digital outputs or device statuses can be routed potential-free to the outside via the potential-free contact. The potential-free contact enables interference-free switching of external actuators, such as signal lamps, valves and pumps). | ☐ |
| Additional special programs, such as hydrolytic resistance test for glassware, rubber clusure test, ramp programs and material test programs | ☐ |
| Further programs as well as product-specific process evaluations and requirement-specific special solutions available on request | ☐ |

◾ = Standard
☐ = Optional

# EASY OPERATION OF THE AUTOCLAVES VIA TOUCH DISPLAY

Operation is quick and easy via an easy-to-read screen with touch function. At the same time, this innovation offers additional options and more flexibility when using the autoclave.

All process-relevant data can be displayed both numerically and graphically. 7 programs are already predefined and the user can create, change or delete up to 100 programs himself.

To easily create a new program, the user is guided through the the process in a dialog. Each new program is automatically assigned a fixed identifier and can also be given a user-definable name. All process parameters can be changed individually.

**Predefined programs**
1  Solids
2  Waste (bag)
3  Liquid waste, with controlled vapor discharge for recooling
4  Liquids, with controlled steam drain for Recooling
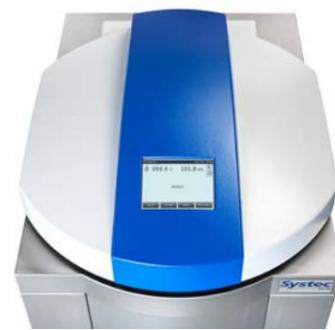5  Cleaning
6  Vacuum-Test*
7  Bowie-Dick-Test*

Expandable to up to 100 sterilization programs.
* Only in conjunction with vacuum system.

**Shorter and more efficient process times**
Thanks to the completely new developed control of the autoclaves.

# QUICK-RELEASE SAFETY DOOR LOCK

Easy and safe - after being pushing the door shut, the door is automatically closed by a circumferential locking ring. A special lip seal made of heat-resistant silicone ensures a reliable seal, which seals more tightly the more the pressure in the sterilization chamber increases. Without the need for additional compressed air or other auxiliary media!

The quick-release door lock is temperature-dependent - in accordance with DIN EN (IEC) 61010-2-040. As long as there is excess pressure or temperature in the sterilization chamber or in the load, the door remains locked. This means there is no risk of coming into contact with hot parts.

**Automatic door opening**
The door opens automatically - either at the touch of a button or automatically at the end of the program (adjustable). Simple, but extremely useful in practice!  Especially when materials need to cool down or dry after autoclaving, this automatic door opening makes the work process easier. The residual steam escapes without further action and without interrupting work.
The residual heat is used to dry the items to be sterilized, which remain in the autoclave for a short time.
The automatic door opening is limited to an angle of approx. 15° so that there is no risk of contamination from the outside. The door is then opened fully by hand to remove the items to be sterilized.
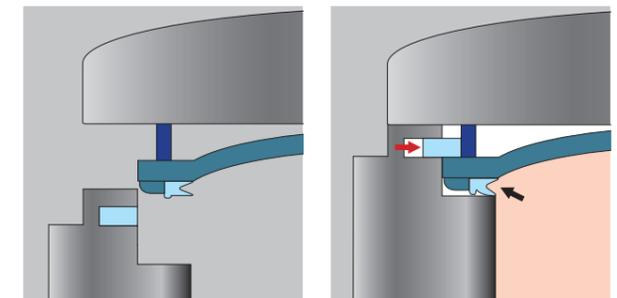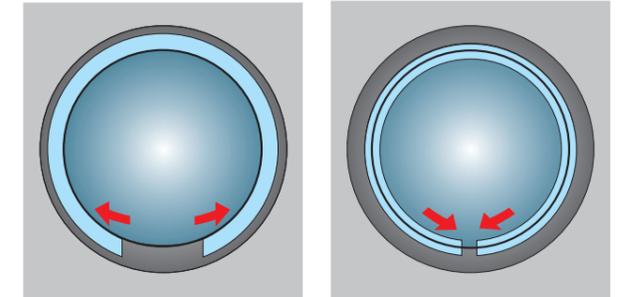
Door open, all-round locking ring in standby position.

Door closed, all-round locking ring in locked position. The internal steam pressure presses the lip seal between the door and the sterilization chamber.

# OPTIONS FOR THE STERILIZATION OF LIQUIDS

## Cooling

With regard to precise sterilization processes, safe handling and increased productivity, Systec autoclaves also offer a wide range of cooling functions for liquid sterilization. Many functions are already included as standard or can be added to the autoclave as an option..

Various optional rapid re-cooling systems can significantly reduce the re-cooling time for liquids and thus reduces the overall the batch time. This protects the culture media and leads to more efficient utilization of the autoclave.

In addition to classic cooling (with controlled steam release to 100 °C) and the subsequent, very slow self-cooling to at least 80 °C, the autoclaves can optionally be equipped with additional system technology for faster recooling processes:

- Recooling with room air ventilation
- Jacket cooling with cooling water
- Jacket cooling with cooling water and support pressure
- Radial ventilator for air circulation for accelerated heat dissipation and therefore reduced cooling time
- Ultracooler, internal cooling element for further reduction of the cooling time
- Spray cooling with soft-water spray and support pressure
- Connection to an open or closed cooling circuit

## Jacket cooling with cooling water and support pressure

During the entire sterilization process, a flexible PT-100 temperature sensor constantly measures the temperature in a reference vessel. This ensures that the sterilization time only starts when the sterilization temperature has been reached in the liquid. The cooling temperature is also permanently monitored. As required by norms and to avoid the risk of delayed boiling, the door can only be opened when the temperature of the liquids has dropped to at least 80 °C. The use of support pressure from sterile-filtered compressed air during the cooling phase reliably prevents the culture media from boiling.

### Advantages
- No loss of liquid due to boiling of the media
- Improved productivity due to reduced cycle times and full utilization of the filling volume in each bottle
- Avoidance of delayed boiling and over boiling
- Avoids the risk of bottles bursting during or after sterilization
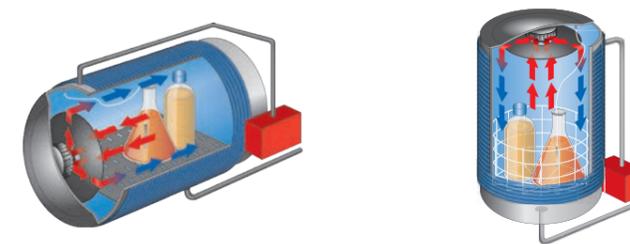- Reduction of recooling time by up to 60%

Recooling time by 60% reduced

# FURTHER OPTIONS FOR THE STERILIZATION OF LIQUIDS

## Radial ventilator

In conjunction with optional jacket cooling using cooling water and support pressure the radial ventialtor ensures an accelerated heat transfer from the sterilized items to the cooled sterilization chamber through air circulation, . The ventilator wheel is driven by the externally mounted motor via a magnetic coupling.

- The radial ventilator is positioned so that it does not reduce the usable space in the autoclave!
- Air flow rate 71 m3/h for Systec VX-Series and Systec DX-Series autoclaves and 250 m3/h for Systec HX-Series  autoclaves
- Reduction of the recooling time by up to 70%

Recooling time by 70% reduced

## Ultracooler

In conjunction with jacket cooling using cooling water, support pressure and radial ventilator, the integration of the additional Ultracooler heat exchanger has succeeded in further reducing the recooling time and therefore the total batch time significantly.

- The Ultracooler is mouted around the radial fan and is positioned that it does not reduce the usable space. This means that the entire interior can be used for full loading!
- Reduction of the recooling time by up to 90 %.

Recooling time up to 90% reduced

# OPTIONS FOR THE STERILIZATION OF SOLIDS AND WASTE IN DESTRUCTION BAGS

## Vacuum device

Typical solids include pipette tips (in boxes), empty glassware and waste in bags as well as porous materials such as filters or textiles . For this type of sterilization, it is important to completely remove the air present in the items to be sterilized to ensure accurate, reproducible and validatable sterilization.

The vacuum device is used for the highly effective removal of air from solids, tubes, porous materials, textiles and destruction bags so that the steam can penetrate into the items to be sterilized. This is achieved by means of a fractionated pre-vacuum in conjunction with the steam generator which is equipped to these autoclaves as standard. This is the only way to achieve a validatable sterilization of porous materials, solids, textiles or waste in destruction bags.
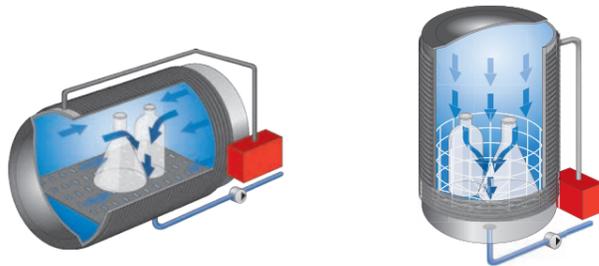


## Drying of solids - vacuum drying & Superdry

Superdry is an extension of vacuum drying. In vacuum drying, the boiling point of the hot condensate is lowered during the drying phase by creating a vacuum, causing the condensate to evaporate. In the program with solid waste odour formation is minimized by the drying vacuum. The Superdry function increases the drying efficiency of solids and porous sterilization items such as filters and textiles. Vacuum drying in conjunction with Superdry eliminates the need for post-drying in a separate drying oven!
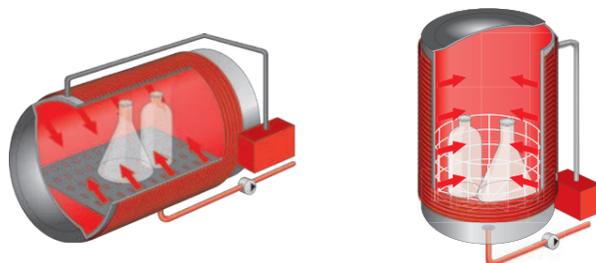


# STERILIZATION OF BIOLOGICAL HAZARDOUS SUBSTANCES

## Exhaust air filtration with condensate inactivation

Systec autoclaves can be equipped with optional exhaust air filtration for the sterilization of hazardous biological substances. This ensures that all gases or liquids that could be a potential risk to the environment when displaced from the autoclave are filtered and sterilized inline

The autoclavable sterile air filter is designed in the form of a filter cartridge. This filter cartridge consists of a PTFE membrane with a pore size of 0.2 μm. The filter cartridge is located in a pressure-resistant housing and can be replaced quickly at any time. Monitored by a PT-100 temperature sensor, the filter cartridge is automatically sterilized inline during each sterilization process.

The condensate is retained in the pressure vessel during the heating and sterilization phase and safely sterilized at the same time.  Exhaust air filtration and condensate sterilization reliably ensure that no germs can escape during the sterilization cycle.

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## The right process for every sterilization task

As described, there are various options that may be necessary in individual cases in order to achieve perfect, validatable sterilization results or faster recooling times, especially for liquids. The options required for this mainly depend on the type of items to be sterilized.  It is advisable to consider them carefully so that the configuration of the autoclave meets your requirements and the intended sterilization tasks. A validatable sterilization process with verifiable biological effectiveness can only be achieved if the device is configured correctly. The following table provides guidance on the appropriate device configuration. We recommend additional individual advice from our specialists.

| Procedure: | Air removal | | | | Cooling | | Drying | | Other |
|---|---|---|---|---|---|---|---|---|---|
| | Gravitation | Simple Pre-vacuum | Pulsating Overpressure | Fractionated Pre-vacuum | Conventional Cooling with slow pressure release | Rapid cooling system with Support pressure | Surface drying without vacuum | Drying with post-vacuum + superdry | Exhaust air filtration |
| Liquids | + | ? | - | - | ? | + | ? | - | |
| Unpackaged solids without hollow bodies | + | + | + | + | | | ? | + | |
| Porous materials (filters, textiles) | - | ? | ? | + | | | - | + | |
| Hollow bodies (pipette tips, empty glassware, tubes and hoses) | - | - | - | + | | | - | + | |
| Contaminated waste in destruction bags | - | - | ? | + | | | - | - | + |

+ Recommended procedure ? Possibly acceptable procedure - Not possible procedure
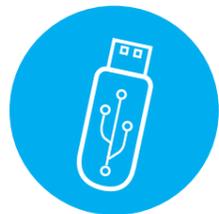
# DOCUMENTATION OPTIONS

**Internal memory**                                    STANDARD

The process data is stored in the internal memory. The capacity is sufficient to store process data over an average period of at least 10 years.  The data contained in the internal memory can be exported as a PDF file with a clear presentation of all process relevant data and parameters or as a CSV file.

**Systec Connect USB**                                 STANDARD

Integrated USB interface for exporting electronic data as a PDF or CSV file via USB. Stick. All relevant data is prepared and clearly displayed in a PDF both numerically and graphically or in the form of a CSV file (readable e.g. with Excel) for further processing in purely numerical form.

**Systec Connect APP**                                 STANDARD

The Systec Connect APP is available free of charge for iOS (Apple) and Android devices. The Systec Connect APP provides information on the current status of your autoclaves as well as on the program sequences in real-time. The prerequisite is that your autoclaves and the mobile device you are using are in the same network.

**Systec Connect WIFI**                                OPTIONAL

If there is no Ethernet network connection at the autoclave's installation place avaialbe, the autoclave can also be integrated wirelessly into your network via WIFI.

**Systec Connect DS (Documentation System)**          OPTIONAL

With the new Systec Connect DS, you can access all information about your autoclaves from any device that is in the same network as the autoclaves. No software installation is required on the respective device. Mobile phones, tablets or stationary computers can be used as devices. Systec Connect DS clearly displays extensive information such as process memory, error memory and audit trail and the data can be downloaded as a PDF or CSV file. The device overview provides information on the status of the autoclaves and whether messages are present or maintenance is due.

# DOCUMENTATION OPTIONS

**Systec Connect Advanced CFR 21 Part 11 solution**    OPTIONAL

The data can be exported from the autoclave via USB or network interface as PDF and/or CSV (Excel) files. Both the PDF and CSV files are electronically signed by the autoclave. This electronic signature can be clearly assigned to the respective autoclave. It also indicates whether the exported files are valid. Any attempt to tamper with it results directly in the respective file being marked as invalid.

**The Advanced CFR 21 Part 11 solution also includes:**
- Advanced User Account Control. This includes, among other things, an individual or global program list per user, the assignment of the user to a customizable group (e.g. User, supervisor, administrator, or Operator.) with individually adjustable rights.
- Audit trail: All actions performed (e.g. changing parameters, starting or stopping sterilization pro grams) are recorded and are documented and can be traced back to the respective user and via a timestamp (date/time).
- Up to 5 fields for electronic signatures to sign the exported PDF or CSV files on a PC (or another device with the functionality to sign documents electronically).

**Systec Connect STF(Save To Folder)**                 OPTIONAL

Systec Connect SFT makes documenting your sterilization processes easier than ever. Simply have the autoclave send all relevant process data as a PDF or CSV file to a computer or server in your network. This is done automatically at the end of a sterilization process. The data is transferred secu-rely via FTP, FTPS or SFPT. To use Systec Connect FTP, an FTP server must be installed in your net-work.

**Systec Connect OPC-UA**                              OPTIONAL

Systec autoclaves can be integrated into LIMS or SCADA systems via the standardized OPC/UA protocol. Integration is largely plug & play. Machine-to-machine communication can also be imple-mented using OPC-UA. OPC-UA enables Systec autoclaves to be optimally integrated into laboratory or production processes with little effort.

**Printer**                                            OPTIONAL

Optionally with integrated printer for documentation of program type and batch number, date / time as well as all relevant process parameters and essential information on the program sequence. The printout is made automatically after the sterilization process.

# ACCESSORIES FOR SYSTEC AUTOCLAVES

# FURTHER SERVICES

Many more
Options &
Programs
for every
Application
available

### Systec DX-Series / Systec HX-Series

Stainless steel-
tub

Stainless steel tub
for Easy Load

Loading-
baskets

Base plate

Rail system with
Easy Load

Transport carriage
for Easy Load

Shelving system
for Easy Load

Transport trolley
with Easy Load

### Systec VX-Series

Stainless steel-
bucket

Loading-
baskets

Lifting device

## Additional equipment and programs

For example, for the food industry for sterilizing liquids in sealed containers, plastic bottles, pouches, cans, blister packs or food packaging, etc:
- Equipment for sterilization in a steam/air mixture.
- Equipment for sterilization with hot water and soft water spray.

## Special designs according to individual requirements

Development and construction of modified systems such as:
- Customer-specific process evaluation and process development.
- Special programs for material testing.
- Repeating program sequences, automatic repetition of sterilization cycles.
- Dry heating chambers with heated compressed air.
- Heating and cooling in definable ramps

## Service close to you

- More than 40 service locations in Germany.
- Available worldwide via a network of trained partners.
- Installation and commissioning.
- Individual service on call.
- Preventive maintenance, contractually agreed or individually commissioned.
- Qualification and validation
- GMP / GLP-compliant documentation.

Detailed information on customized designs and process solutions on request.

For the evaluation of your process parameters-autoclaves are available in our R&D laboratory.

## Qualification and validation

As part of our services, we also offer you qualification and validation work with GMP / GLP-compliant documentation:
- **DQ - Design Qualification**
  - Definition of the requirements for the device in terms of installation and process technology.
- **IQ - Installation Qualification**
  - The autoclave was manufactured and installed according to the definitions in the design specification
- **OQ - Operation Qualification**
  - The autoclave functions as defined in the design specification.
- **PQ - Performance Qualification**
  - The sterilization process permanently sterilizes the product according to predefined specifications.
- **FAT - Factory Acceptance Test**
  - Proof of fulfillment of all technical and quality-related requirements before delivery.
- **SAT - Site Acceptance Test**
  - Acceptance of the device at its installation site directly at the customer's premises.

# Systec

the autoclave company

Headquater Germany:
Systec GmbH & Co KG
Konrad-Adenauer-Strasse 15
35440 Linden, Germany
T +49 6403 67070-0
F +49 6403 67070-222
info@systec-lab.de
www.systec-lab.de

Susidiary Switzerland
Systec Switzerland GmbH
Gewerbestrasse 8
CH-6330 Cham, Switzerland
T +41 41 781 52 80
F +41 41 781 52 79
info@systec-lab.ch
www.systec-lab.ch

Subsidiary China:
Systec (Shanghai) trading co., ltd
D1-201, No.6000 Shenzhuan Rd.
Songjiang 201619
Shanghai, China
T +86 21 6019 0256
info@systec-lab.com.cn
www.systec-lab.com.cn