CONTENTS

1 NOTES ON THIS MANUAL

This manual describes all operations involved in using the Systec DX/DE Series autoclaves. The manual

- is written especially for Systec DX/DE Series autoclaves,
- is designed to inform the user of this product and
- addresses qualified technical employees with several years' work experience.

The manual should be handed over along with the product.

For technical personnel instructed in its use, brief instructions describe the operational steps involved in the day-to-day use of the appliance.

1.1 Appended documents

This operating manual includes an appendix with the following documents:

- Installation and master circuit diagram
- List of replacement parts
- Evaluation report on internal pressure dimensioning in accordance with AD 2000 (not for DX/DE -23, -45)
- EC design test certificate (not for DX/DE -23, -45)
- Conformity declaration in accordance with pressure equipment directive 97/23/EC
- Appliance log book

1.2 Diagrams

All diagrams in this operating manual are only examples. Depending on the model and size, there may be deviations from the representations in the diagrams. The original diagrams in the text are to be used for all work carried out on the appliance.

1.3 Copyright declaration

2 DESCRIPTION OF APPLIANCE

Aim of this section

This section gives you an overview of the functions and design of DX/DE Series Systec autoclaves.

Contents

2.1 Description of functions

The Systec DX/DE Series autoclaves described in this operating manual are designed for use in laboratories for sterilization in steam or a steam-air mixture. They are state-of-the-art and built according to standard safety regulations.

2.1.1 DX-Serie

With the innovative design characteristics of the DX series, the process procedures are simpler, safer and more precise. The processes can be reproduced and validated:

- Microprocessor controlling with plain text menu
- Individual setting of parameters for the sterilization processes
- Steam generation in its own steam generator
- Fractionated heating-up
- Thermostat-controlled exhaust steam condenser
- Heat holding function
- Automatic starting of the autoclave

With its wide range of options, the Systec DX Series autoclaves can be optimally adapted to the individual circumstances of the day-to-day laboratory.

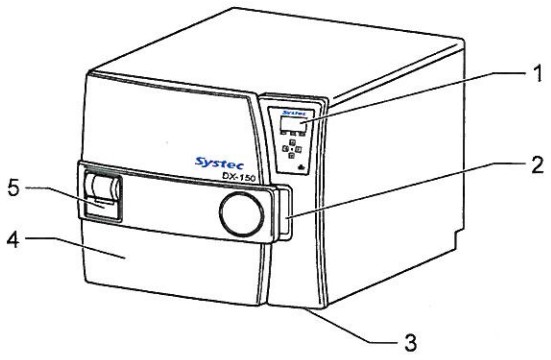
2.1.2 DE-Serie

The DE series, in contrast to the DX series, does not have a separate steam generator. The steam is normally generated in the sterilization chamber. As a matter of principle, the processes here can only be reproduced and validated for the sterilization of liquid.

There are also options for the DE series to be adapted to the individual conditions in an everyday laboratory.

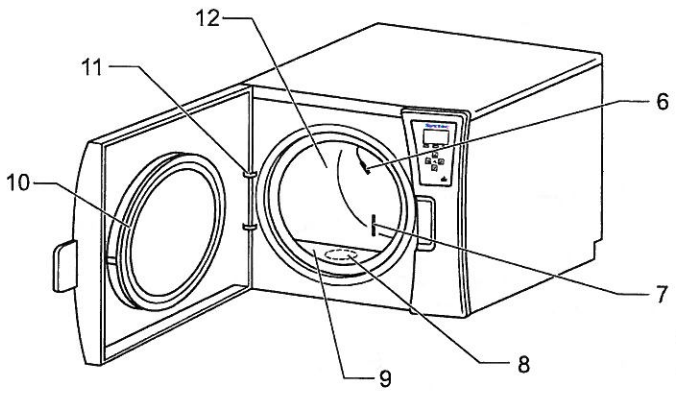
2.2 Design

2.2.1 Control elements on the front of the appliance



1 = Control panel
2 = Grip handle
3 = Main switch
4 = Door
5 = Printer (optional)

Fig. 1: Systec DX/DE Series; door closed



6 = Flexible temperature sensor
7 = Water level sensor
8 = Dirt strainer
9 = Barrier (demineralised water) (only DE Series)
10 = Seal
11 = Hinge
12 = Autoclave chamber

Fig. 2: Systec DX/DE Series; door open

2.2.2 Connections on the back of appliance for DX/DE -65, -90, -100, -150, -200

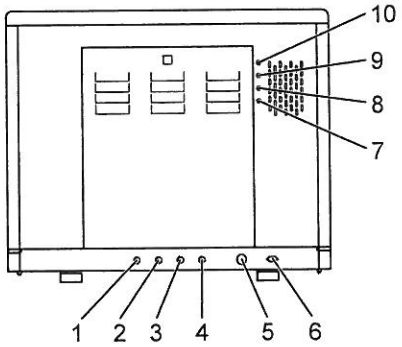


Fig. 3: Systec DX/DE Series; back view

1 = Cooling water (3/4") outer thread Pressure > 1 bar
2 = Demineralised water (3/4") outer thread Pressure > 1 bar
3 = Compressed air (7.2 mm quick release connector)
4 = Waste water (3/4") outer thread (drain provided by customer temperature-resistant to 103 °C)
5 = Power supply (3 phase, 380-400 V + N + PE)
6 = Serial interface (RS 232 for connection to a PC)
7 = Safety temperature limiter fuse
8 = Water feed pump fuse
9 = Compressor fuse
10 = Vacuum pump fuse

Included in scope of delivery for item:

1 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
2 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
3 = Compressed air hose 3 m, DN6, with plug and coupling (only with rapid recooling with cooling water and support pressure option)
4 = Drainage pipe 3 m, DN13.5
5 = Connection cable 2 m (5 x 2.5 mm²) with CEE plug 16 A
6 = Interface cable 5 m (only with PC software option)

The scope of delivery also contains: tool (pliers) for changing the exhaust filter cartridge (only with the air exhaust filtration option).

2.2.3 Connections on the back of appliance DX 23

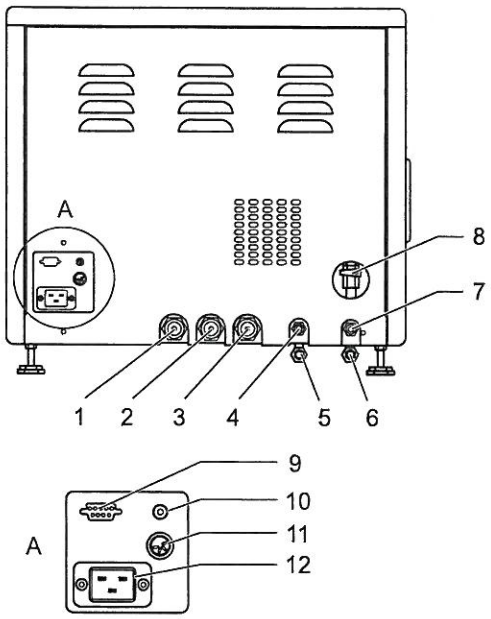


Fig. 4: Systec DX 23; back view

1 = Waste water (3/4") outer thread (drain provided by customer temperature-resistant to 103 °C)
2 = Cooling water (3/4") outer thread, Pressure > 1 bar
3 = Demineralised water (3/4") outer thread, Pressure > 1 bar
4 = Compressed air (7.2 mm quick release connector), optional
5 = Steam generator safety valve
6 = Sterilization chamber safety valve
7 = Drainage, demineralised water reservoir container
8 = Drainage tap for reservoir container
9 = Serial interface (RS 232 for connection to a PC)
10 = Safety temperature limiter fuse
11 = Connection for Aquastop
12 = Network connection (230 V 50/60 Hz)

Included in scope of delivery for item:

1 = Drainage pipe 3 m, DN 13.5
2 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
3 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread), optional
4 = Compressed air hose 3 m, DN6, with plug and coupling (only with rapid recooling with cooling water and support pressure option)
7 = Silicon hose 0.5 m, ∅ interior: 8 mm, exterior: 12 mm
9 = Interface cable 5 m (only with PC software option)
11 = Aquastop
12 = Connection cable 2 m (3 x 1.5 mm²) with earth contact plug 16A

2.2.4 Connections on the back of appliance DE 23

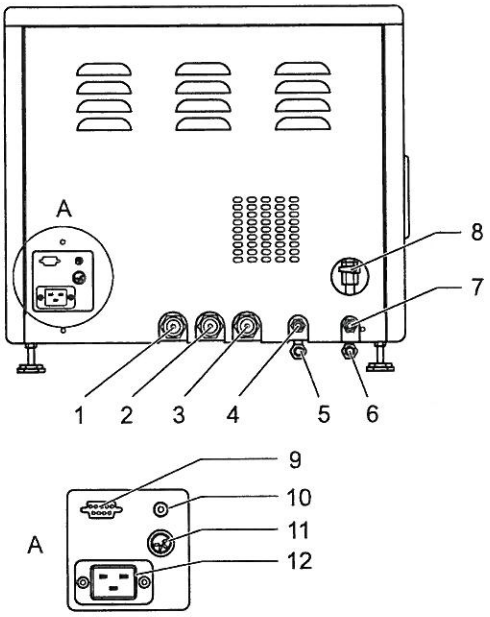


Fig. 5: Systec DX 23; back view

1 = Change-over valve, demineralised water (recirculate or drain)
2 = Cooling water (3/4") outer thread, Pressure > 1 bar
3 = Waste water (3/4") outer thread (drain provided by customer temperature-resistant to 103 °C)
4 = Compressed air (7.2 mm quick release connector), optional
5 = Sterilization chamber safety valve
6 = Drainage, demineralised water reservoir container
7 = Drainage tap for reservoir container
8 = Serial interface (RS 232 for connection to a PC)
9 = Safety temperature limiter fuse
10 = Network connection (230 V 50/60 Hz)

Included in scope of delivery for item:

2 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
3 = Drainage pipe 3 m, DN 13.5
4 = Compressed air hose 3 m, DN6, with plug and coupling (only with rapid recooling with cooling water and support pressure option)
6 = Silicon hose 0.5 m, ∅ interior: 8 mm, exterior: 12 mm
8 = Interface cable 5 m (only with PC software option)
10 = Connection cable 2 m (3 x 1.5 mm²) with earth contact plug 16A

2.2.5 Connections on the back of appliance DE-23 with automatic demineralised water supply option

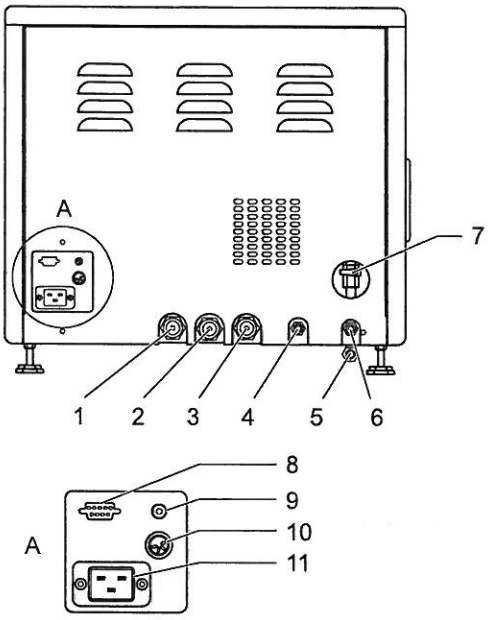


Fig. 6: Systec DE-23 with automatic demineralised water supply option, back view

1 = Waste water (3/4") outer thread (drain provided by customer temperature-resistant to 103 °C)
2 = Cooling water (3/4") outer thread, Pressure > 1 bar
3 = Demineralised water (3/4") outer thread, Pressure > 1 bar
4 = Compressed air (7.2 mm quick release connector), optional
5 = Sterilization chamber safety valve
6 = Drainage, demineralised water reservoir container
7 = Drainage tap for reservoir container
8 = Serial interface (RS 232 for connection to a PC)
9 = Safety temperature limiter fuse
10 = Connection for Aquastop
11 = Network connection (230 V 50/60 Hz)

Included in scope of delivery for item:

1 = Drainage pipe 3 m, DN 13.5
2 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
3 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread), optional
4 = Compressed air hose 3 m, DN6, with plug and coupling (only with rapid recooling with cooling water and support pressure option)
6 = Silicon hose 0.5 m, ∅ interior: 8 mm, exterior: 12 mm
8 = Interface cable 5 m (only with PC software option)
10 = Aquastop
11 = Connection cable 2 m (3 x 1.5 mm²) with earth contact plug 16A

2.2.6 Connections on the back of appliance DX/DE-45 with automatic demineralised water supply option

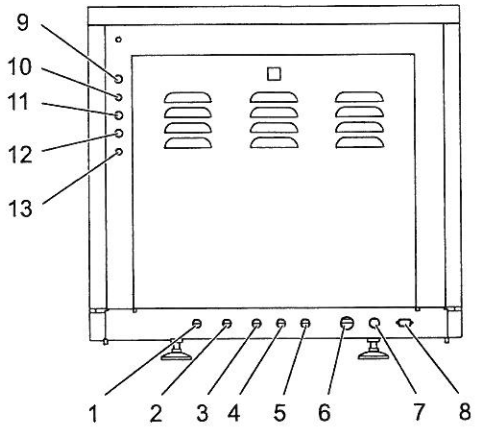


Fig. 7: Systec DX/DE-45 with automatic demineralised water supply option, back view

1 = Cooling water (3/4") outer thread, Pressure > 1 bar
2 = Demineralised water (3/4") outer thread, Pressure > 1 bar
3 = Compressed air (7.2 mm quick release connector), optional
4 = Drainage, demineralised water reservoir container
5 = Waste water (3/4") outer thread (drain provided by customer temperature-resistant to 103 °C)
6 = Network connection (230 V 50/60 Hz)
7 = Connection for Aquastop
8 = Serial interface (RS 232 for connection to a PC)
9 = Fan fuse (optional)
10 = Vacuum pump fuse (optional)
11 = Demineralised water fuse
12 = Compressor fuse
13 = Safety temperature limiter fuse

Included in scope of delivery for item:

1 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
2 = Water hose 2 m, DN10 (3/4" inner thread incl. adapter to ½" inner thread)
3 = Compressed air hose 3 m, DN6, with plug and coupling (only with rapid recooling with cooling water and support pressure option)
4 = Silicon hose 0.5 m, ∅ interior: 8 mm, exterior: 12 mm
5 = Drainage pipe 3 m, DN13.5
6 = Connection cable 2 m (3 x 1.5 mm²) with CEE plug 16 A
7 = Aquastop
8 = Interface cable 5 m (only with PC software option)

The scope of delivery also contains: tool (pliers) for changing the exhaust filter cartridge (only with the air exhaust filtration option).

2.2.7 Pass-through autoclaves, Systec DX Series 2D

With pass-through autoclaves, a distinction is made between the device side and the clean room side. The location of the operating elements on both sides corresponds to that of the DX Series.

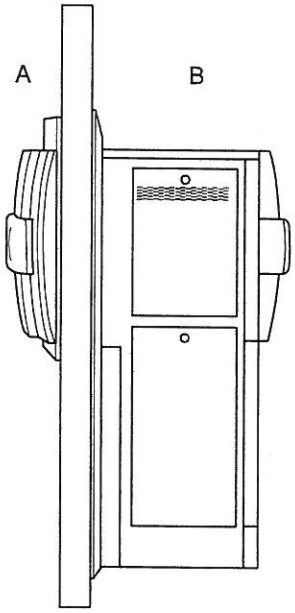


Fig. 8: Systec DX Series 2D; side view

A = Clean room side

B = Device side

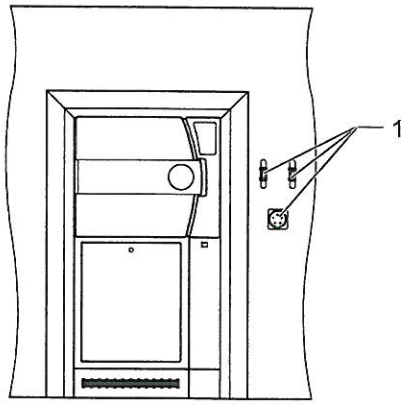


Fig. 9: Systec DX Series 2D; device side

1 = Connections provided by customer (example)

Control panel elements:

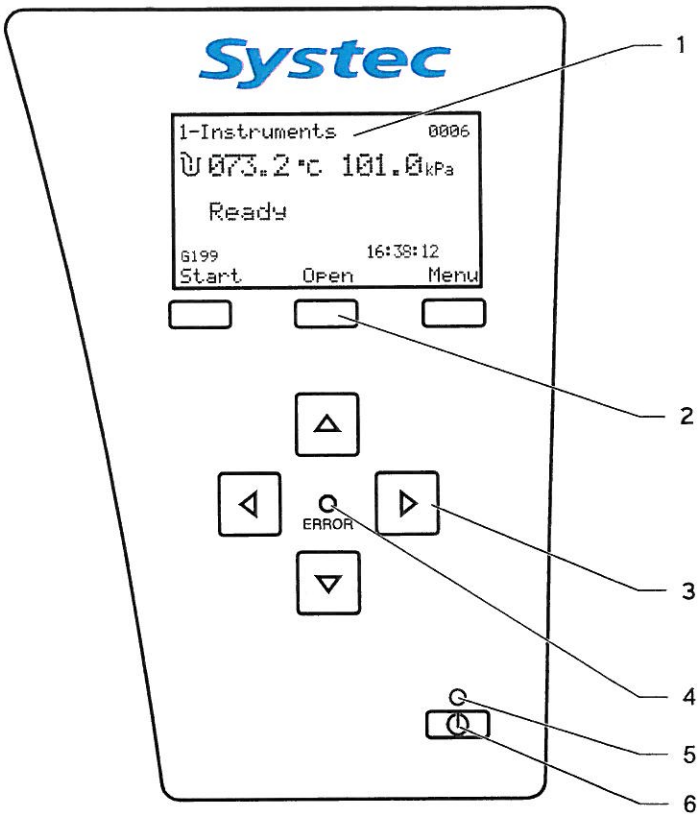


Fig. 10: Systec DX/DE Series; controller

1 Display
2 Display keys: select the functions at the top of the display (e.g. Start)
3 Arrow keys: select menu items and set values
4 LED: error
5 LED: standby
6 "On/Off" key: switch the autoclave on and off

2.3 Proper usage in line with instructions

The autoclave is used for the sterilization of liquids and solids in steam or in a steam-air mixture.

A different use, or one that goes beyond the use described above, is not permitted.

The operator must ensure that the product to be sterilized is suitable for steam sterilization in the autoclave with the options installed. This applies in particular to appliances without a vacuum device, for example, for the sterilization of hollow objects and porous materials.

Systec GmbH is not responsible for any damage resulting from incorrect use.

Correct use also entails
- observing all the instructions in the operating manual
- carrying out inspection and maintenance work
- only allowing the appliance to be operated by persons instructed by trained technical personnel, who must adhere to the operator's working and safety regulations.

We are not responsible for damage resulting from improper or impermissible use.

The autoclave is not approved under the law for medical products based on EN 285.

Impermissible use of the appliance is, for example:
- the sterilization of surgical instruments.

2.4 Structural alterations to the autoclave

No alterations, extensions or modifications may be made to the autoclave without the manufacturer's authorization. This also applies to welding performed on supporting parts or parts relevant to safety, such as pressure boilers and all attachment parts.

All modification measures require a written authorization from Systec GmbH.
- Machine parts that are not in perfect condition should be immediately replaced.
- Only use original replacement and wear parts.
- In the case of parts from other manufacturers, there is no guarantee that they are designed and produced so as to satisfy stress and safety requirements.

2.5 Technical standards

- The permissible pressure and temperature values must not exceed the pressure and temperature values specified in this operating manual (cf. chapter 10: "Technical data"). The specifications on the identify-cation plate / label must be observed.
- Permissible sterilization substances and sterilization receptacles are those for which it has been assured, either by their state-of-the-art condition or from the operator's experience, that they possess the biological, chemical and physical characteristics required for safety in day-to-day laboratory use, and that they are suitable for steam sterilization in autoclaves with the options installed.

2.6 Warranty and liability

Our "general sale and delivery conditions" apply here. These are available to the operator from the signing of the contract at the latest. Warranty and liability claims in the case of damage to persons or material damage are rendered ineffective if the damage has been due to one or more of the following reasons:

- Improper use of the autoclave.
- Improper mounting, commissioning, operating and maintenance of the autoclave, and non-adherence to the pressure container regulation.
- Operating the autoclave with defective safety equipment or with safety and protection devices that have not been mounted correctly or are not functioning correctly.
- Non-observance of the instructions in the operating manual relating to transport, storage, mounting, commissioning, operating, maintenance and loading the autoclave.
- Unauthorized structural alterations to the autoclave.
- Unauthorized changing of the original design of the autoclave.
- Insufficient supervision of components exposed to wear.
- Incorrectly performed repairs.
- Disasters caused by foreign bodies or acts of God.

2.7 Guarantee and servicing

Your Systec autoclave is a high-quality product. We hereby declare that this appliance is free from material and workmanship errors and provide a one-year guarantee on defects in components or their correct functioning. We are only obliged to repair or replace appliances or their components after we have examined them, and only if the damage can be demonstrated to have occurred within two years of the delivery date.

Service telephone number: +49 (0)641-982120

If you have difficulties operating the appliance and cannot find the solution in these operating instructions, please contact Systec GmbH at the telephone number given above. Under no circumstances should you try to repair the appliance yourself!

Systec GmbH
Laboratory systems technology

Sandusweg 11
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Fax: +49 (0)641 98211 - 21
E-mail: info@Systec-Lab.de
www.Systec-Lab.de

3 SAFETY

Aim of this section

This section gives you an overview of the fundamental safety aspects of using Systec DX/DE Series autoclaves.

Contents

3.1 Observe the instructions in the operating manual

This operating manual
- informs you about the safe usage and trouble-free operation of the appliance
- informs you of the basic safety instructions and safety regulations
- contains important instructions on how to operate the autoclave safely
- and is to be read by all persons working with the autoclave.

In addition, the rules and regulations for accident prevention that are in force on-site are to be observed, particularly the printer guidelines.

3.2 Obligations of the operator

The appliance operator is obliged to
- register the appliance with the relevant authorities, in accordance with its usage and with the local regulations
- operate the appliance with the required technical safety measures
- only use trained and authorised personnel for all jobs such as electrical installation, commissioning the appliance, and maintenance
- only allow persons to work with the autoclave who are familiar with the basic regulations on work safety and accident prevention, who have been instructed how to handle the autoclave, and who have read the operating manual carefully, understood it and confirmed this with their signature.

Special instructions

It must be checked at regular intervals that personnel are working in a safety-conscious manner.

3.3 Obligations of personnel

All persons who are responsible for working with the autoclave are obliged to
- observe the basic regulations regarding work safety and accident prevention
- use the prescribed personal protective equipment
- perform only the assigned tasks
- read this operating manual carefully and confirm with their signature that they have understood it

3.4 Residual risks of working with the autoclave

The autoclaves are state-of-the-art and built according to standard safety regulations. Nevertheless, the danger of death or injury to the user or a third party, or damage to the autoclave or other material assets, can arise when using the appliance.

For this reason, the autoclave is only to be used:
- as it is intended to be used and
- in a faultless condition with regard to safety.

Faults that could impact on safety must be resolved immediately.

The following residual risks result from the function of the autoclave, and must be considered at all times:

3.4.1 Burns

After sterilization:
- hot clouds of steam can escape and lead to burns
- the surfaces inside the container or near the sterilization substance can be hot and can lead to burns if contact is made with them.

3.4.2 Heavy loads

Fully-loaded baskets or fillers can be too heavy to lift manually when putting them in or taking them out. If this is the case, the baskets or fillers should be partially unloaded beforehand.

3.4.3 Hazardous substances

When sterilizing solids or liquids that have been contaminated with hazardous substances, the prescribed personal protective equipment appropriate for the hazardous substances in question must be used.

3.4.4 Danger of fire or explosion

When sterilizing flammable or explosive solids or liquids, the prescribed procedures for the flammable or explosive substances in question must be followed.

3.4.5 Operation

After using the autoclave, it must be ensured that the appliance is properly switched off by means of the main switch and that all supply sources, such as the cooling water and compressed air supplies, have been closed.

"Aquastop" option for avoiding water damage

To avoid water damage, we recommend the "Aquastop" option as an additional safety measure.

3.4.6 Risks due to wear

The autoclave is to be serviced at the regular intervals set by the operator, as specified in the servicing regulations. The manufacturer recommends regular servicing every 500 cycles, or at least once a year.

3.5 Specific risks of individual sterilization procedures

Additional specific risks can arise when using particular sterilization cycles. You will find the specific instructions regarding these risks and how to avoid them in the corresponding descriptions in the following sections of this operating manual.

3.5.1 Incorrect use of the cycles for solids

When sterilizing liquids in glass containers with the cycle for solids, the boiling process can be delayed and the glass container can shatter.

3.6 Warning instructions and safety signs

In addition to the basic and specific safety instructions, risks can arise through dangerous working procedures.

These procedures are indicated as follows:

Warning!

These indications warn of the danger of serious or even fatal injuries. Instructions on how to avoid danger must be followed. A safety sign corresponding to the particular type of danger gives additional warning of the danger.

Attention!

These indications refer to possible material damage.
Follow the instructions precisely to prevent faulty operation or damage to the appliance.

3.7 Supplementary instructions

Any operating variants or additional notes on the basic working procedures are indicated as follows:

Special instructions

These indications give information about, for example, additional or alternative procedures which are possible under certain circumstances.

4 OPERATION

Aim of this section

This section gives you an overview of the requirements of the Systec DX/DE Series autoclave with regard to its location, its basic operation and the loading of the various items to be sterilized.

Contents

Diagrams

Tables

4.1 Commissioning

4.1.1 Special features of the pass-through autoclaves

For pass-through autoclaves, see the separate design plan.

4.1.2 Installation site

Note the following when selecting an installation site for the autoclaves:
- The installation site selected must ensure that all sides of the autoclave are accessible.
- Only original tubes provided by the manufacturer are to be used.

Connections for one-door autoclaves

The supply and disposal connections should be located in the immediate proximity of the autoclave. The installation should be performed in such a way as to avoid bending the tubes and cables. The necessary supply connections are illustrated in chapter 02 “Description of appliance”.

Queries regarding the connections?

Contact the manufacturer if you have queries about the connections. You will find the contact details in chapter 2 of this manual: “Description of appliance”.

4.1.3 Installation and training

The installation must be performed by an authorised service technician!

The service technician ensures that the appliance is connected correctly, performs a function test, and enters the appliance-specific data in the appliance log book.

Following the installation, the service technician gives the users a briefing on the autoclave. The technician also enters the names of the persons briefed and the date in the appliance log book and confirms the work done with a stamp and a signature.

4.1.4 User’s guide and brief instructions

The operator draws up a user’s guide on how to operate the autoclave and places it together with the brief instructions in the immediate vicinity of the autoclave, in a place where it can be clearly seen.

The user’s guide must meet the standards applicable in the country in question.

4.2 Control elements

Familiarize yourself with the operation of the autoclave and its control elements before using it for the first time.

The following diagram shows the position of the control elements relevant to operation when the door is closed:

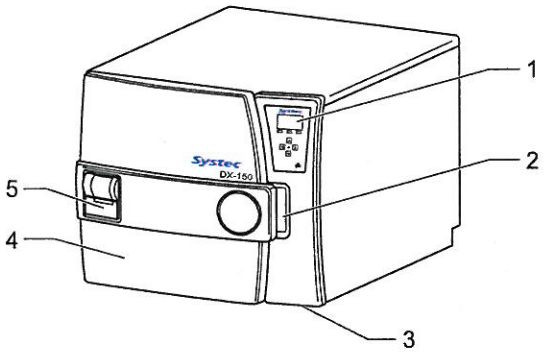


Fig. 1: Position of the autoclave's control elements with closed door

1 = Control panel
2 = Grip handle
3 = Main switch
4 = Door
5 = Printer (optional)

4.2.1 Main switch

The main switch switches the power supply to the autoclave on and off. Always switch off the autoclave at the main switch after use, or if some danger has been detected in the autoclave.

In case of danger, switch off power supply.

When the power supply is switched off during operation, the current process is interrupted. The autoclave gradually returns to a depressurized state and low temperature, and can then be opened safely.

After the power supply is interrupted and then switched on again, the autoclave returns to the state it was in before the power supply was interrupted. Any error messages that may have been displayed on the control panel before the interruption are displayed exactly as before. Of course, the pressure and temperature values displayed reflect the current state.

4.2.2 Door

Danger of burns when unloading!

After the procedure has been completed and the unloading temperature of the item being sterilized has been reached, parts of the autoclave area can still be at considerably higher temperatures.

To avoid burns, always open the door using the grip handles.

Automatic door locking!

The Systec DX/DE Series is equipped with an automatic door lock. A lock ring grips the door and locks it securely.

DX/DE -65 – 200: To facilitate the locking process for you, a vacuum is created when the door closes which holds the door closed until the safety ring has mechanically locked the door.

DX/DE-45: No vacuum is created when the door closes which means that you have to manually hold the door closed until it is completely locked.

Closing the door:

- Press the door in and hold it in briefly until the door locking device has clearly locked.

Opening the door:

- Press the Open display key. The door is unlocked and automatically opens 3 to 4 cm. To open the door completely, use the grip handle.

Danger of burns!

After the procedure has been completed and the unloading temperature of the item being sterilized has been reached, parts of the autoclave area can still be at considerably higher temperatures.
To avoid burns, always open the door using the grip handle.

Door locking device!

A locking device prevents the door from being opened accidentally. The door lock can only be unlocked if the unloading temperature has been reached and the sterilization chamber is in a depressurized state.

4.3 Control panel

The autoclave is microprocessor-controlled. The entire operation of the autoclave takes place over the control unit. The control unit combines a touch pad keyboard for entries with a display for the results of the controlling.

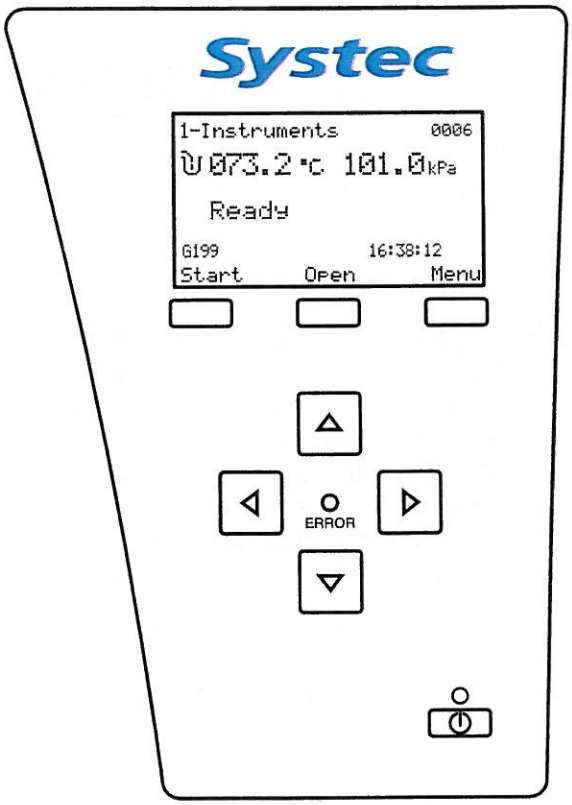


Fig. 2: The control panel of the Systec DX/DE Series

4.3.1 Display

The current cycle parameters and all the states of the appliance are shown in the display. It can display symbols as well as alphanumeric characters. The display is equipped with background lighting, which is permanently switched on.

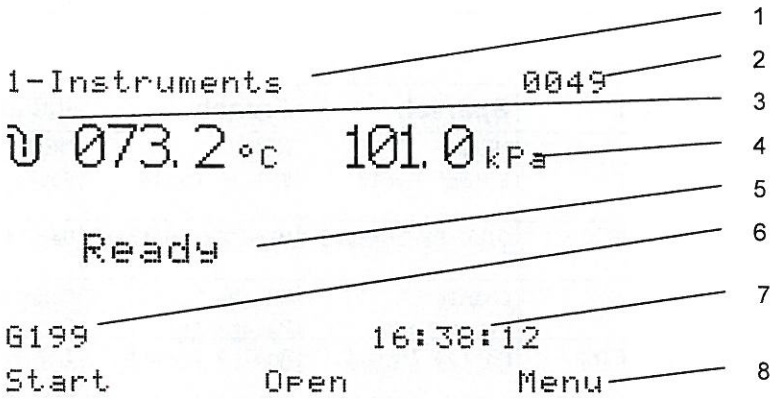


Fig. 3: Control unit display with appliance on standby (door closed)

After switching on, the display shows the following information:

1 = The currently selected cycle number and cycle name
2 = The cycle counter, which increases by "1" for every sterilization cycle
3 = A symbol representing the control sensor selected for the current cycle

	Flexible temperature sensor
	Sensor in the steam outlet (Only DX series)

4 = Current temperature (in °C) and current pressure (in kPa) in the appliance
5 = Text box with instructions, and possibly error messages and status information

Ready	Door closed, autoclave ready for operation. The door can be opened with the Open display key. The process selected can be started with the Start display key.
Not ready	Autoclave not (yet) ready for operation (e.g. door not closed, steam generator still building up pressure).

6 = Current pressure in the steam generator (in kPa) (Only DX series, in DE series due to the lack of steam generator "G 000")
7 = Current time
8 = Functions that can be selected using the display keys below the display

The display language can be selected!

The language shown in the display can be set as a parameter. In this operating manual, the displays correspond to the factory settings of the autoclave. Depending on the language setting selected, the display text can differ from the examples given here. If you would like to adapt the language setting to your needs, the following table provides you with a comparative list of all available display texts in the respective language setting.

English	German	Spanish	French	Italian
MENU	MENU	MENU	MENU	MENU
Select Cycle	Programm waehlen	Select Cycle	Select Cycle	Seleziona Ciclo
View Parameters	Parameter zeigen	View Parameters	View Parameters	Vedi Parametri
Change Parameters	Parameter aendern	Change Parameters	Change Parameters	Cambia Parametri
Analog Inputs	Analoge Eing.	Analog Inputs	Analog Inputs	Ingres. Analogici
Digital Inputs	Digitale Eing.	Digital Inputs	Digital Inputs	Ingressi Digitali
Outputs	Ausgaenge	Outputs	Outputs	Uscite
Calibration	Kalibrieren	Calibration	Calibration	Calibrazione
Clock	Uhr	Clock	Clock	Orologio
Manual Output Set	Ausgaenge setzen	Manual Output Set	Manual Output Set	Set Manual Uscita
Language	Sprache	Language	Language	Lingua
Printer Test	Drucker Test	Printer Test	Printer Test	Test stampante
System Info	System Info	System Info	System Info	Informaz. Sistema
SELECT CYCLE	Programm waehlen	SELECT CYCLE	SELECT CYCLE	SELEZ. CICLO
1-Instruments	1-Festkoerper	1-Instrumentos	1-Instruments	1-Strumenti
2-Instruments	2-Festkoerper	2-Instrumentos	2-Instruments	2-Strumenti
3-Instruments	3-Festkoerper	3-Instrumentos	3-Instruments	3-Strumenti
4-Waste (Bags)	4-Abfall (Beutel)	4-Residous bolsas	4-Dechets solides	4-Rifiuti Solidi
5-Waste (Bags)	5-Abfall (Beutel)	5-Residous bolsas	5-Dechets solides	5-Rifiuti Solidi
6-Liquids Waste	6-Abfall fluessig	6-Residous-liq.	6-Dechets liquide	6-Rifiuti Liq.
7-Liquids Waste	7-Abfall fluessig	7-Residous-liq.	7-Dechets liquide	7-Rifiuti Liq.
8-Liquids	8-Fluessigkeiten	8-Liquidos	8-Liquide+refroid	8-Liquidi
9-Liquids	9-Fluessigkeiten	9-Liquidos	9-Liquide+refroid	9-Liquidi
10-Liquids	10-Fluessigkeiten	10-Liquidos	10-Liquide+ref.	10-Liquidi

English	German	Spanish	French	Italian
11-Liquids	11-Fluessigkeiten	11-Liquidos	11-Liquide	11-Liquidi
12-Cleaning	12-Reinigen	12-Limpieza	12-Nettoyage	12-Pulizia
13-Vacuum Test	13-Vakuum Test	13-Prueba vacio	13-Test de Vide	13-Test vuoto
14-BD Test	14-BD Test	14-BD Prueba	14-BD Test	14-B&D Test
Not ready	Nicht bereit	Not ready	Not ready	No PRONTA
Chamb.No Wtr	Kam. Wasser !	Chamb.No Wtr	Chamb.No Wtr	CameraNo Acq
Door Open	Tuer offen !	Door Open	Door Open	Porta Aperta
Gen. Low Prs	Generator	Gen. Low Prs	Gen. Low Prs	Gen. Bassa P
Gen.No Water	Kein Gen.Wasser	Gen.No Water	Gen.No Water	Gen.No Acqua
Tank empty	Tank leer	Tank empty	Tank empty	Tank empty
Press Err	Press Err	Press Err	Press Err	Premi Errore
Repl. Filter	Filtertausch	Repl. Filter	Repl. Filter	Cambia Filt.
Sel.Temp Err	Sel.Temp Err	Sel.Temp Err	Sel.Temp Err	Sel.Temp Err
LANGUAGE	Sprache	LANGUAGE	LANGUAGE	LINGUE
English	Englisch	English	English	Inglese
French	Franzoesisch	French	French	Francese
German	Deutsch	German	German	Tedesco
Italian	Italian	Italian	Italian	Italiano
Spanish	Spanisch	Spanish	Spanish	Spagnolo
CYCLE PARAMETERS	ProgrammPARAMETER	CYCLE PARAMETERS	CYCLE PARAMETERS	PARAMETRI CICLO
SET PARAMETER	SET PARAMETER	SET PARAMETER	SET PARAMETER	SET PARAMETRI
CALIBRATION	Kalibrieren	CALIBRATION	CALIBRATION	CALIBRAZ.
SET GAIN OFFSET	SET GAIN OFFSET	SET GAIN OFFSET	SET GAIN OFFSET	SET GAIN OFFSET
CALC.GAIN OFFSET	CALC.GAIN OFFSET	CALC.GAIN OFFSET	CALC.GAIN OFFSET	CALC.GAIN OFFSET
SET CLOCK	Uhr stellen	SET CLOCK	SET CLOCK	SET ORA
INPUTS	EINGAENGE	INPUTS	INPUTS	INGRES.
ANALOG INPUTS	ANALOG EINGAENGE	ANALOG INPUTS	ANALOG INPUTS	INGR. ANALOG.
DIGITAL INPUTS	DIGITAL EINGAENGE	DIGITAL INPUTS	DIGITAL INPUTS	INGR. DIGITALI
OUTPUTS	AUSGAENGE	OUTPUTS	OUTPUTS	USCITE
ENTER CODE	ENTER CODE	ENTER CODE	ENTER CODE	SET CODICE
START BY TIME	Autostart	START BY TIME	START BY TIME	FUNZ. TIMER
SYSTEM INFO	SYSTEM INFO	SYSTEM INFO	SYSTEM INFO	INF. SISTEMA
FAIL	Fehler	FAIL	FAIL	FAIL
CYCLE ENDED	Programm beendet	CYCLE ENDED	CYCLE ENDED	CYCLE ENDED
Dry	Trocknung	Dry	Dry	Dry
Ready	Bereit	Ready	Ready	Ready
Opening Door	Tuer oeffnen	Opening Door	Opening Door	Opening Door
Door Open	Tuer ist offen	Door Open	Door Open	Door Open

English	German	Spanish	French	Italian
Water Inlet	Wasser einlass	Water Inlet	Water Inlet	Water Inlet
Heating to Stay1	Aufheizen 'Stay1'	Heating to Stay1	Heating to Stay1	Heating to Stay1
Stay1	Haltezeit 'Stay1'	Stay1	Stay1	Stay1
Heating to Stay2	Aufheizen 'Stay2'	Heating to Stay2	Heating to Stay2	Heating to Stay2
Stay2	Haltezeit 'Stay2'	Stay2	Stay2	Stay2
Heating to Ster	Aufheizphase	Heating to Ster	Heating to Ster	Heating to Ster
Sterilize	Sterilisier-phase	Sterilize	Sterilize	Sterilize
Exh-Fast	Ablass	Exh-Fast	Exh-Fast	Exh-Fast
Exh-Slow	Ablass	Exh-Slow	Exh-Slow	Exh-Slow
Air Cooling	Raumluft-kuehlung	Air Cooling	Air Cooling	Air Cooling
Cool Durham	Durham Kuehlung	Cool Durham	Cool Durham	Cool Durham
Water Cool	Kuehlung	Water Cool	Water Cool	Water Cool
Holding Temp	Warmhalte-phase	Holding Temp	Holding Temp	Holding Temp
Prevacuum-Vac	Vakuum	Prevacuum-Vac	Prevacuum-Vac	Prevacuum-Vac
Prevacuum-Stay	Haltezeit	Prevacuum-Stay	Prevacuum-Stay	Prevacuum-Stay
Prevacuum-Press	Dampfstoss	Prevacuum-Press	Prevacuum-Press	Prevacuum-Press
Prevacuum-Exh	Dampfablass	Prevacuum-Exh	Prevacuum-Exh	Prevacuum-Exh
Opening Door	Tuer oeffnet !!	Opening Door	Opening Door	Opening Door
Reset Done!!	Reset !!	Reset Done!!	Reset Done!!	Reset Done!!
Systec	Systec	Systec	Systec	Systec
Autoclaves	Autoclaves	Autoclaves	Autoclaves	Autoclaves
Pulse Num:	Puls Nr :	Pulse Num:	Pulse Num:	Pulse Num:
On Test	Testphase	On Test	On Test	On Test
TEST ENDED	TEST BEENDET	TEST ENDED	TEST ENDED	TEST ENDED
Reset Wait...	Reset !!!	Reset Wait...	Reset Wait...	Reset Wait...
CoolCompAir	Kuehlung + Druck	CoolCompAir	CoolCompAir	CoolCompAir
Loading wait	Systemstart warten	Loading wait	Loading wait	Loading wait
Saving Wait...	Speichern...	Saving Wait...	Saving Wait...	Saving Wait...
Changing Language	Changing Language	Changing Language	Changing Language	Changing Language
No Liquids!!!	keine Loesungen !	No Liquids!!!	No Liquids!!!	No Liquids!!!

English	German	Spanish	French	Italian
Error messages				
Comp.Air Error	Keine Druckluft	Comp.Air Error	Comp.Air Error	Comp.Air Error
Door Not Closed	Tuer nicht geschl.	Door Not Closed	Door Not Closed	Porta Aperta
Ring SW. Error	Ring Schalter Fehler	Ring SW. Error	Ring SW. Error	Errore SW Anello
Door SW. Error	Tuer Schalter Fehler	Door SW. Error	Door SW. Error	Errore SW Porta
Drain Condens please wait	Kondens wasser ablassen	Drain Condens please wait	Drain Condens please wait	Drain Condens please wait
High Chamb.Press	High Chamb.Press	High Chamb.Press	High Chamb.Press	Pres.Camera Alta
High Chamb.Temp.	High Chamb.Temp.	High Chamb.Temp.	High Chamb.Temp.	Temp. Camera Alta
High Gen.Press	Gen. Ueberdruck	High Gen.Press	High Gen.Press	Press. Gen. Alta
Low Chamb.Press	Low Chamb.Press	Low Chamb.Press	Low Chamb.Press	Pres.Camera Bassa
Low Chamb.Temp.	Low Chamb.Temp.	Low Chamb.Temp.	Low Chamb.Temp.	Temp.Camera Bassa
Low Steam	Kein Dampf	Low Steam	Low Steam	Vapore Basso
Low Vacuum	Kein Vakuum	Low Vacuum	Low Vacuum	Vuoto Basso
Manual Stop	Benutzerabbruch	Manual Stop	Manual Stop	Stop Manuale
No Chamb Water	Kammer o. Wasser	No Chamb Water	No Chamb Water	No Acqua Camera
No Demin. Water	Kein VE Wasser !	No Demin. Water	No Demin. Water	No Alim Gen Acqua
No Gen.Water	kein Gen. Wasser	No Gen.Water	No Gen.Water	No Acqua Gen.
No Tap Water	Kein Kuehlwasser!	No Tap Water	No Tap Water	No Alim Pompa Acq
Sensor Error	Sensor Fehler	Sensor Error	Sensor Error	Errore Sensore
Test Fail	Test gescheitert	Test Fail	Test Fail	Test Fallito

Tab. 1: Overview of the text display in the display, depending on the language setting selected

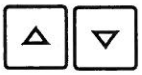
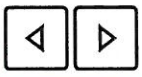
4.3.2 Touch pad keyboard

The following keys are on the control unit of the autoclave:

	"On/Off" key for switching the autoclave on and off. After the autoclave is switched on, the display is activated and the steam generator begins to build up the steam supply. There is a green LED above the key. If this LED is flashing, the autoclave is in standby mode and the display and all power consuming devices are switched off.

Tab. 2: Function overview of "On/Off" key

The arrow keys are used to select the desired function:

	- Move cursor in vertical direction - Autoclave cycle - Menu items - Parameters from the list
	- Move cursor in horizontal direction - Set time and date - Scroll 5 entries forwards/backwards in the menu

Tab. 3: Arrow key function overview

The display keys are used to select the desired function:

Open	- Unlocks the door
Start	- Starts the selected cycle
Menu	- Displays the main menu
Stop	- Ends or prematurely interrupts a cycle
Quit	- Cancels alarm messages
Set	- Display or change the selected menu item
Exit	- Return to higher-level menu
Save	- Save changes

Tab. 4: Function overview for display keys

The display keys can have other additional functions independently of the current operating context.

Special instructions

The autoclave can only be switched on via the "On/Off" key of the control unit if the power supply has been switched on via the main switch first.
The door must be locked before a selected cycle can be started.

4.3.3 Light emitting diodes

The following conditions are additionally signalled by the autoclave via light emitting diodes on the control unit.

	The standby mode is signalled by the flashing of the green LED above the "On/Off" key.
ERROR	The red LED between the arrow keys lights up in the event of an error.

Tab. 5: The LEDs of the control unit

Special instructions

Error messages in the display must always be canceled using the Quit key and, when required, by entering the corresponding code for the access level, before the operation of the autoclave can continue.
Some error messages can only be canceled if the appliance has first been switched off and back on again via the main switch.

4.3.4 Access level

The access level protects the autoclave from unintentional incorrect operation. To call functions that are assigned to a particular access level, a code must first be entered for this access level.

Codes from operator!

The everyday functions can be used either directly or with the code for the first access level.
The codes for a particular access level are provided to personnel by the operator.

4.3.5 Using the menu

All the functions of the autoclave can be accessed through the menus of the control unit. However, the basic operation always remains the same.

Access level

You must have access to a certain access level to be able to select particular functions.

1. Opening the menu:
   - Press the Menu display key in the basic display to go to the main menu.
2. Selecting the desired menu item:
   - You use the arrow keys ▵ ▿ to navigate to the desired menu item in the list. The menu item selected is indicated by the cursor.
   - Use the Set display key to select the menu item indicated. Use the Exit display key to leave the menu.
3. Displaying and changing parameters:
   - You use the arrow keys ▵ ▿ to navigate to the desired parameter in the list. The parameter selected is indicated by the cursor.
   - The Set display key displays the value to be changed.
   - Use the arrow keys ◃ ▹ to select the part of the value to be changed.
   - You adjust the selected value using the arrow keys ▵ ▿.

Cancelling changes!

Press the Exit display key to cancel your changes. The saved parameter value is not changed and the parameter display is exited.

- You save your change with the Save display key.
- By means of the Exit display key you exit this parameter display and change to the higher-level menu.

4.3.6 Example: How to change the time and date

Fig. 4: Using the menu: Basic display

- Press the Menu display key to go to the main menu.

The first of 4 menu items is indicated by the cursor.

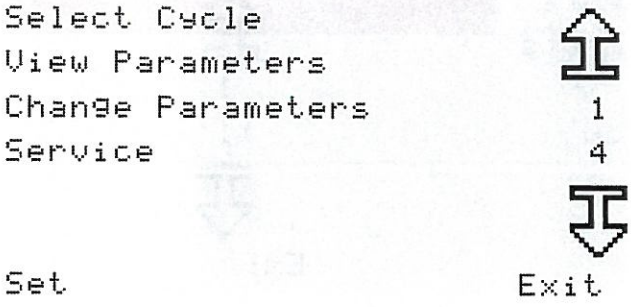


Fig. 5: Using the menu: Main menu

- Use the ▲ ▽ keys to navigate to the Service menu item.

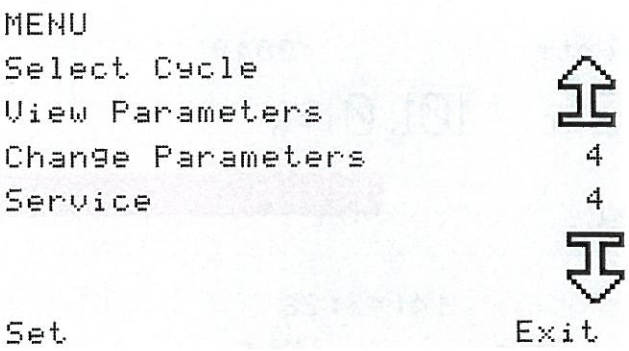


Fig. 6: Using the menu: Navigation to the desired menu item

- Press the Set display key to select the desired menu item.

The first menu item is indicated by the cursor.

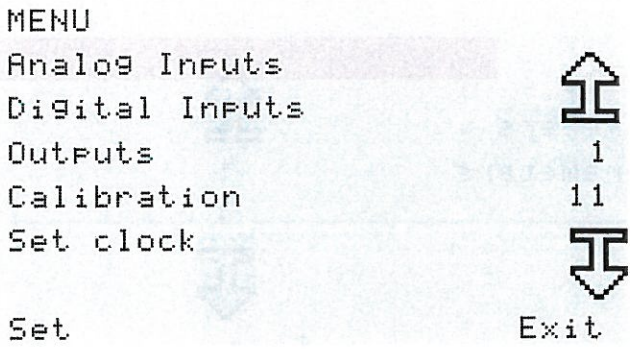


Fig. 7: Using the menu: Selecting the desired menu item

- Use the ▲ ▽ keys to navigate to the desired menu item.

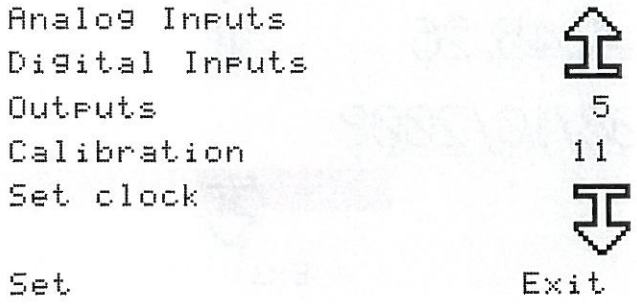


Fig. 8: Using the menu: Selecting the desired menu item

- Press the Set display key to select the desired menu item.

The desired parameter is displayed. If the parameters can be changed, the cursor jumps to the first changeable value of the displayed parameter.

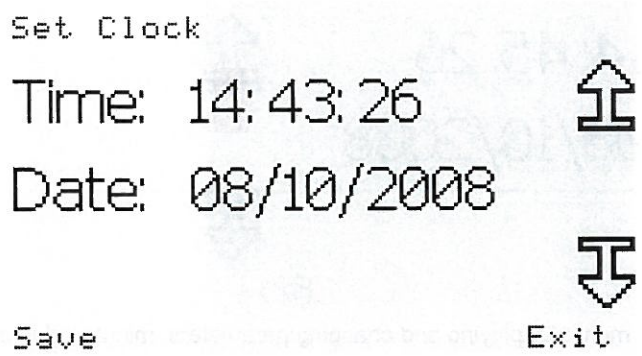


Fig. 9: Using the menu: Displaying and changing parameters, hour value selected

- Use the ◁ ▷ keys to navigate to the desired value of the selected parameter.

- You can change the value with the ▲ ▼ keys.

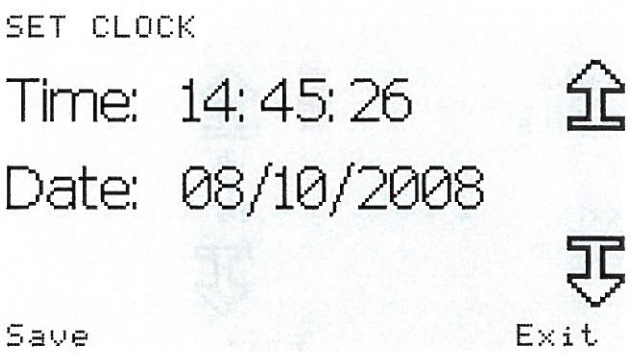


Fig. 10: Using the menu: Displaying and changing parameters, minute value changed

- Press the Save display key to save the changes.

The message DONE in the display confirms the saving.

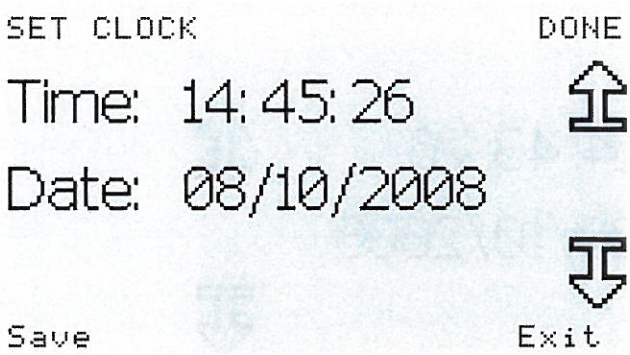


Fig. 11: Using the menu: Displaying and changing parameters, minute value change saved

- Press the Exit display key to leave the parameter display and switch to the higher-level menu.

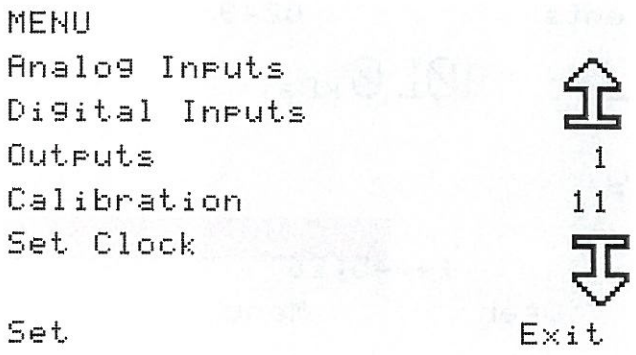


Fig. 12: Using the menu: Returning to the higher-level menu

- Press the Exit display key to leave the menu and switch to the main menu.

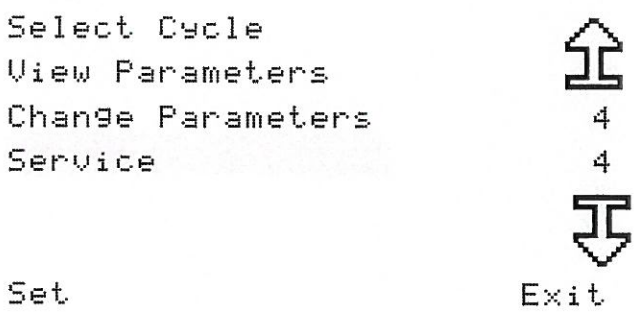


Fig. 13: Using the menu: Returning to the main menu

- Press the Exit display key to leave the main menu and return to the basic display.

Fig. 14: Using the menu: Basic display with changed time

4.3.7 Menu structure

You access the main menu by means of the Menu display key in the basic display. From this point on, you can select the control unit menu items. The following table gives an overview of the standard configuration.

Menu item	Submenu	Explanation
Select cycle		
	1-Instruments 2-Instruments 3-Instruments 4-Waste (Bags) 5-Waste (Bags) 6-Liquids Waste 7-Liquids Waste 8-Liquids 9-Liquids 10-Liquids 11-Liquids 12-Cleaning 13-Vacuum Test 14-BD-Test	Selection of the desired cycle. It can also be selected directly from the basic display using the arrow keys. For a description, see the section "Selecting the cycle". Can only be performed with appliances with a vacuum device. Can only be performed with DX series with a vacuum device.
View parameters		
	SterTemp SterTime DryTime Pulses EndTemp	Display of the parameters of the selected cycle. For a description, see the section "Parameters".

Menu item	Submenu	Explanation
Change parameters	Enter code	Changing the system parameters depending on the access level. For description see the section "Parameters".
Service		For the Service menu item, see the following table.

Service menu item		
Analog inputs		Displaying the analog input values for controlling.
Digital inputs		Displaying the digital input values for controlling.
Digital outputs		Displaying the digital output values for controlling.
Calibration	Enter code	Calibration, Service function.
Clock		Displaying and changing the date and time. For a description, see the section "Example: How to change the time and date".
Manual output set	Enter code	Display and change digital outputs. Service function.

Menu item	Submenu	Explanation
Language	English German Spanish French Italian	Selecting the language of the display.
Memory	Process log	The last 10 sterilization cycles are saved. They can be selected and printed (using optional printer).
	Error log	All error messages are saved and can be printed (using optional printer).
Change address	Enter code	Set whether the control panel is to be on the clean room side or the device side; service function
System info		System information (panel version, system version, serial number, number of cycles (devices with exhaust filter), ambient pressure set)

Tab. 6: Overview of the menu structure of the control unit

4.4 Special features of the DX/DE -23, -45

4.4.1 Filling manually with demineralised water

DX/DE-23 and DX/DE-45 are equipped with a reservoir container for demineralised water. This enables the appliances to be operated even when a demineralised water connection is not provided by the customer. However, you MUST ensure that the reservoir container is filled with enough demineralised water BEFORE and DURING operation.

Demineralised water connection provided by customer

When a demineralised water connection is provided by the customer, operation is the same for the other DX/DE Series autoclaves.

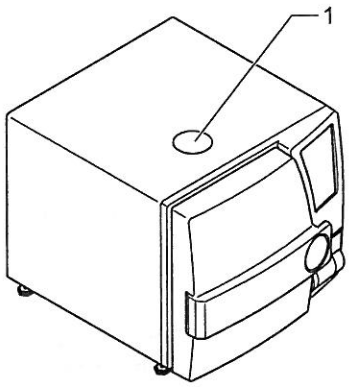


Fig. 15: Cap of the reservoir container for demineralised water

- Remove the cap (1) from the reservoir container.
- Fill the reservoir container with demineralised water to just below the top edge.

Fill up the reservoir container in standby mode only!

DE Series only: When the change-over valve is set to "Recirculation", you may fill the appliance with demineralised water in standby mode only. Otherwise, the reservoir container could overflow.

- Close the reservoir container with the cap.

If there is not enough demineralised water in the reservoir container when the cycle is started, the message Tank empty appears in the display.

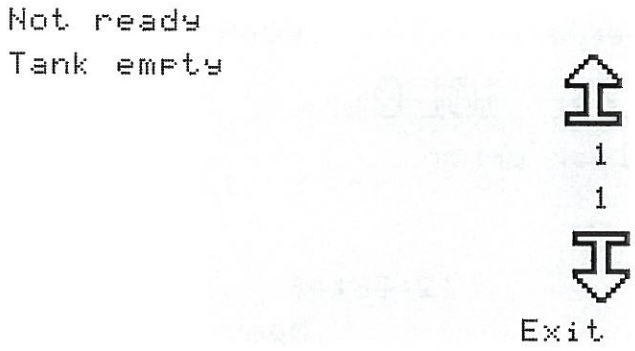


Fig. 16: Message: fill demineralised water

- Remove the cap from the reservoir container.
- Fill the reservoir container with enough demineralised water.
- Close the reservoir container with the cap.
- Start the cycle again.

DX Series only: The reservoir accommodates enough demineralised water for a standard sterilization process. For longer sterilization processes, the water level must be checked regularly and, if necessary, topped up.

If there is an insufficient supply of demineralised water, the sterilization process is interrupted and an error message appears in the display.

When transporting the appliance, or when decommissioning it for a longer period, you must turn off the demineralised water from the reservoir container via the drainage tap on the side of the appliance.

4.4.2 Door lock of DX/DE-23

The door lock of the DX/DE-23 differs from that of the other appliances in the DX/DE series, and must be handled somewhat differently:

- Close the door until you hear it click into place
- Press the Start display key – the door is locked automatically.

If the door is not locked after approx. 30 seconds, for example because an object is blocking the door lock, the cycle is interrupted with an error message (see chapter 8, Error description).

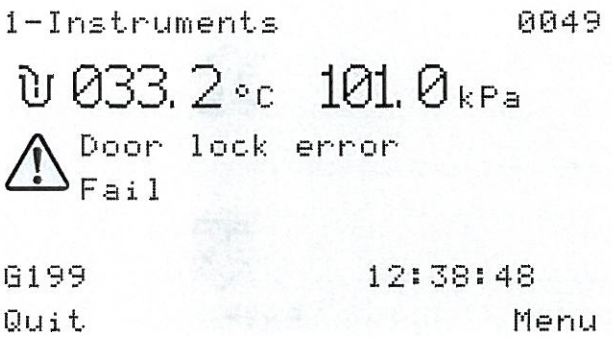
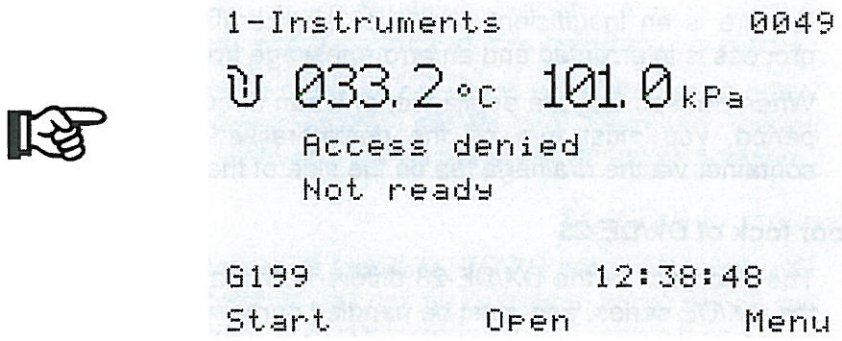


Fig. 17: Display message Door lock error if the door is not locked correctly

- To open the door and remove the cause of the error, confirm the error message by pressing the Quit display key and entering the code for the access level.

Automatic door unlocking

Until the door is completely unlocked and you can open it, the message Access denied appears in the display.



4.4.3 Aquastop

The DX/DE -23, -45 with "Automatic demineralised water supply" option is also delivered as standard with an "Aquastop", which is additionally equipped with a tabletop sensor.

Connect the "Aquastop" to the socket on the back of the appliance and place the sensor close to the appliance.

Connect Aquastop!

If you do not connect the "Aquastop" supplied, the integrated "Automatic demineralised water supply" will be deactivated.

4.4.4 Location of water level electrode and dirt strainer in DX/DE-23

For maintenance, cleaning and care of the autoclave, see chapter 07.

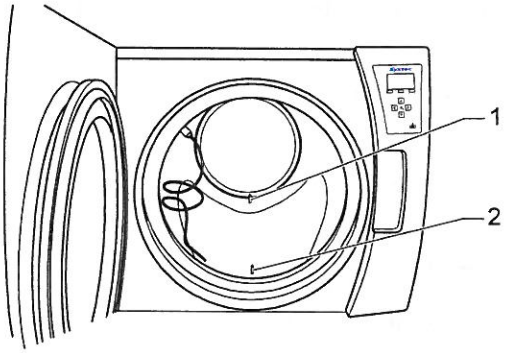


Fig. 18: Location of water level electrodes and dirt strainer (fig. shows DX appliance)

Pos.	DX appliances	DE appliances
1	Dirt strainer	Two water level electrodes
2	One water level electrode	Dirt strainer

Tab. 7: Location of water level electrodes and dirt strainer in DX and DE Series

Water level electrodes and dirt strainer in DE appliances

With DE appliances, you will find two water level electrodes in the rear of the sterilization chamber and the dirt strainer in the front behind the barrier.

You can unscrew the dirt strainer to clean it.

Fig. 19: Schmutzsieb

Thread with aluminium paste!

Before installing it, make sure that the thread is sufficiently lubricated with aluminium paste.

4.5 Special features of pass-through autoclaves

With the pass-through autoclaves of the Systec DX Series 2D, you can always only open one door. If you open the door on the clean room side, the door on the device side is automatically locked, and vice versa.

When commissioning the appliance, the service technician sets the type of locking and enters it in the appliance log book.

"Door mode" setting	Door locking
1	Only one door can be opened at a time.
2	The door on the clean room side (door 2) can only be opened: – after a successful cycle run and – once the opposite door has not been opened.
3	The door on the device side can only be opened: – after a successful cycle run and – once the opposite door has not been opened.
4	The door on the device side or the clean room side can only be opened: – after a successful cycle run and – once the opposite door has not been opened.

Tab. 8: Setting the "Door mode"

The appliance can be operated by means of the control panels on either side, which have equal priority. You can always see the position of the opposite door on the display.

Opening the door with a slight delay

In contrast to one-door autoclaves, the doors on pass-through autoclaves open with a slight delay.

4.6 Sterilization

For sterilization, there are 11 different sterilization cycles at your disposal. The following gives you an overview of the operations you must carry out for the sterilization.

4.6.1 Overview

Pay attention to the relevant safety instructions!

This brief overview presupposes a knowledge of the relevant safety instructions for working with autoclaves and items sterilized in autoclaves. See chapter 3 "Safety" and familiarize yourself with the fundamental risks involved in handling the autoclave, and pay attention to the following instructions concerning the individual steps in the procedure.

Note!

The following sections give you a detailed description of the individual operations.

To sterilize, you proceed as follows:

- Select the cycle appropriate for the item being sterilized.
- DE Series 65 – 200 only, without connection to demineralised water supply: Fill the sterilisation chamber with demineralised water to the top edge of the barrier.
- DE - 23, - 45 only: See the section "Special features for DX/DE -23, -45" in chapter 04 "Operation".
- Load the autoclave with the item to be sterilized.
- Close the door.
- Start the selected autoclave cycle.

The autoclave procedure then takes place automatically. The controller measures the current temperature, pressure and time values, checks these against the target values saved, and adjusts the process accordingly.

End of cycle

When the autoclave procedure has ended, an acoustic signal sounds and the message `Cycle ended` appears in the display.

To remove the autoclaved item, the following steps must be taken:

- Open the door.
- Take the autoclaved item out of the autoclave chamber and proceed with it as prescribed in your laboratory.

The autoclave is now ready for the next autoclave procedure.

Switch off the autoclave!

If you do not intend to use the autoclave for several hours:
- close the door and
- switch the autoclave off via the main switch!

4.6.2 Selecting the cycle

Depending on the item being sterilized, you select an appropriate sterilization procedure in order to:
- eliminate risks to personnel and to the laboratory
- guarantee a successful sterilization result

The selection of the suitable sterilization procedure consists of choosing the corresponding cycle.

A cycle is selected using the arrow keys on the control unit. The corresponding cycle number, the name of the cycle and the pictogram for the temperature sensor used appear in the display.

Eleven sterilization cycles, one cleaning cycle and two test cycles are preprogrammed in the factory setting. These pre-settings are in accordance with the DIN 58951-2 recommendations for steam sterilizers for laboratory items being sterilized.

The parameters can be adapted to the particular requirements of your laboratory!

The Systec DX/DE Series is flexible in its design so as to be suitable for all the usual laboratory applications. For this reason, the cycle parameters are variable to a large degree.
Make sure that you only use cycles and autoclave items in accordance with your laboratory regulations!
If necessary, see the "Parameter" section and familiarize yourself with how to adapt the sterilization parameters to your requirements.

You will find an exact description of the individual sterilization cycles in chapter 5: "Sterilization cycles". The following table gives you a brief overview of the recommended sterilization cycles and their parameters:

Item being sterilized	Sterilization temperature	Sterilization time	Removal temperature	Cycle No.
Solids, instruments	134 / 121 °C	7 / 20 min.	--	1 - 3
Liquids in containers	121 °C	15 min.	80 °C	6 - 11
Laboratory waste in bags	121 °C	20 min.	99°C	4 - 5

Tab. 9: Recommended sterilization parameters for various items being sterilized

4.6.3 Loading the autoclave with solids

(Cycle Nos. 1, 2 and 3)

Do not autoclave any liquids with the solids cycle!

The sterilization of liquids in solids cycles causes danger through boiling delays or exploding vessels and can result in serious injuries.
For this reason, liquids may only be sterilized using the cycle Nos. 6 to 11, which are designed for this purpose. Therefore, before the start of a solids cycle, a corresponding safety query must be confirmed.

Danger of burns when unloading!

In cycle Nos. 1, 2 and 3, the door can be opened when the atmospheric pressure has been reached. The temperature in the appliance or that of the sterilized products can still be 100 °C or more.
When removing the products, wear appropriate protective clothing to avoid being burned.

Ensure that the products and packaging used are suitable!

Make sure here that

- the products are suitable for steam sterilization at temperatures >121 °C or >134 °C.
- any packaging used is permeable to steam
- the products are not sterilized in tubs or similar vessels, as then the products could be damp or even wet when being taken out.
- when sterilizing plastics, tubes, etc., only a permissible sterilization temperature is set.

- Place the flexible temperature sensor in the holder provided for it in the sterilization chamber.
- Load the autoclave with the products to be sterilized. Put the products either on the perforated bottom plate or in a wire-mesh basket.

4.6.4 Loading the autoclave with liquids

(Cycle Nos. 6, 7, 8, 9, 10 and 11)

Use the flexible temperature sensor!

For the sterilization of liquids, an autoclave with a temperature-dependent door lock is required.
The flexible temperature sensor must therefore be placed in the liquid or in a reference vessel. The reference vessel should have the same size and fill volume as the vessel containing the liquid to be sterilized.

Only use these cycles for liquids!

The sterilization of liquids in solids cycles causes danger through boiling delays or exploding vessels and can result in serious injuries.
For this reason, liquids may only be sterilized using the cycle Nos. 6 to 11, which are designed for this purpose!

Danger of explosion with tightly-closed containers!

With closed containers, water cooling may only be used in conjunction with support pressure supply. If no support pressure supply is available, the containers must be open!

Danger of burns when unloading!

Only take vessels filled with liquid out of the autoclave with the greatest care while adhering to all safety instructions. Leaking or otherwise escaping liquids can cause scalding or burns.
When removing the products, wear appropriate protective clothing to avoid being burned.

Use temperature-resistant vessels!

For the sterilization of liquids, it is absolutely necessary to select temperature-resistant vessels that can withstand the sterilization temperatures (>121 °C).

Danger of formation of condensation!

Never use a tub or the "loading basket only perforated in the upper third". Through condensation, the accumulating condensate collects in the tub or in the "loading basket perforated in the upper third". In the DE series, this can lead to a lack of water and to the termination of the process.

Liquids can be sterilized in open vessels. With the option for rapid cooling with support pressure, tightly-closed vessels can also be used.

For the sterilization of open vessels you can use one of the cycles with water cooling (Nos. 6, 7, 8, 9 or 10) as well as the cycle without active cooling (No. 11).

- Place the vessels filled with liquid on the perforated bottom plate or in the wire-mesh basket.

With open vessels, boiling can reduce the volume of the liquid to be sterilized after the sterilization process by up to a maximum of 5%. The filling height of open vessels may be a maximum of 75% of the fill volume.

On opening the autoclave, tightly-closed vessels can still be at temperatures above the unloading temperature.

Systec autoclaves offer an additional safety feature!

The operator can set a cooling rate that fixes a minimum cooling time, depending on the cooling system and the loading. For example, if the temperature sensor has not been placed in the liquid by the user, or the vessel bursts during the sterilization procedure, the effective room temperature is measured and not the temperature of the media. However, the effective room temperature is far less than the temperature of the media during the cooling phase. Because of this incorrect value, the autoclave can be opened here even though the liquids are still boiling. The minimum cooling time ensures that, regardless of the unloading temperature, the autoclave can only be opened when this cooling time has elapsed.
The cooling rate (K/min) must be determined and set by the user, depending on the type of load.

4.6.5 Loading the autoclave with waste in bags

(Cycle Nos. 4 and 5)

Do not autoclave any liquid waste!

Only laboratory waste in solid form and with only a small proportion of liquid may be sterilized.
Liquid waste must be sterilized in cycle nos. 6 and 7 (Liquids waste).

Danger of burns when unloading!

Only take the autoclaved item out of the autoclave with the greatest of care while adhering to all safety prescriptions.
When removing the products, wear appropriate protective clothing to avoid being burned.

Use tubs!

The item being sterilized must be sterilized in tubs in order to prevent the autoclave becoming dirty or damaged due to leaks in rubbish bags or other containers.

Melting of the item being autoclaved!

Do not place the flexible temperature sensor in the item being autoclaved.
The temperature sensor should be placed in the holder provided for it in the sterilization chamber, or else freely in the chamber.

Do not overload the autoclave!

For an optimal result, the steam must reach all parts of the item being sterilized. Overloading the autoclave can lead to insufficient ventilation of the autoclave and may cause faults to occur.
Safe sterilization can only be achieved by autoclaves equipped with a vacuum facility.

- Place the flexible temperature sensor in the holder provided for it in the sterilization chamber.
- Load the autoclave with the products to be sterilized. Put the products either on the perforated bottom plate or in a wire-mesh basket.

4.6.6 Closing the door

When you have loaded the autoclave in accordance with the instructions, close the door.

Automatic door locking!

The Systec DX/DE Series is equipped with an automatic door lock. A lock ring grips the door and locks it securely.

DX/DE -65 – 200: To facilitate the locking process for you, a vacuum is created when the door closes which holds the door closed until the safety ring has mechanically locked the door.

DX/DE-45: No vacuum is created when the door closes which means that you have to manually hold the door closed until it is completely locked.

DX/DE-23: See section "Door lock of DX/DE-23" in chapter 04 "Operation".

To lock the door:

- Press the door in until the seal comes into contact with it.

The partial vacuum is created. You can follow this procedure in the display: the displayed chamber pressure falls by a few kPa.

- Hold the door in this position until the door locking device has clearly locked.

The Ready message in the display tells you that the door is completely locked.

Fig. 20: Display message Ready when door is locked

4.6.7 Starting the cycle

Make sure there is sufficient paper in the printer!

If an optional printer is installed, it automatically logs the entire cycle procedure from the start of the cycle.
The last metre of the paper roll is indicated by a red stripe. If necessary, read up on how to reload the printer paper in the chapter 06 "Options".

- If the door is locked, start the selected cycle by pressing the Start display key.

Safety in the solids cycles!

In the solids cycles (1, 2 and 3), no liquids may be sterilized, as explained in the previous section.

To prevent liquids mistakenly being autoclaved in a solids cycle, a safety query is performed after the Start display key is pressed.

When you are sure that no liquids are in the autoclave, confirm the query by entering the code of your access level.

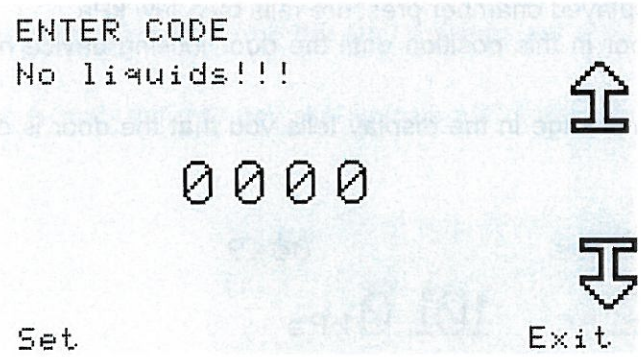


Fig. 21: No liquids safety query in the solids cycles

From this point on, the controller takes over the entire procedure. In the display you will see a plain text report about the first phase of the sterilization program.

Preselectable starting time

If the parameter StartByTime is set to "1" in the cycle selected, the current time and the current date appear after the Start display button is pressed. You can use the arrow keys to set the desired start time and press the Start display button to enter this time. Instead of the current time, the time remaining until the start is displayed.

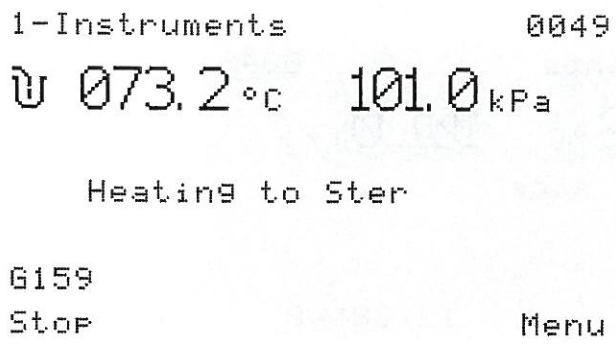


Fig. 22: Display message Heating to Ster when cycle is started

4.6.8 End of program

After the completion of an autoclave cycle, an acoustic signal sounds and the message Cycle ended appears in the display.

The autoclave procedure is completed and the item being sterilized can be taken out and used in accordance with the prescribed practices of your laboratory, as described in the sections “Opening the door” and “Taking out the autoclaved item”.

4.6.9 Stopping the cycle

If you wish to end a cycle prematurely, you must stop the procedure in progress.

Items possibly not completely sterilized!

Depending on the point at which the sterilization process is interrupted, the sterilization may be incomplete. An interruption in the warm-up or sterilization phase causes the cycle to pass directly to the cool-down phase. To guarantee a complete sterilization in this case, you must repeat the entire sterilization procedure!

Stopping the cycle manually does not speed up the process!

By interrupting the process in the cooling-down phase, for example, you do not speed up the process. Please consider that the door can only be opened when the unloading temperature has been reached and atmospheric conditions prevail inside the chamber.

- Press the Stop display key.

This message appears in the display:

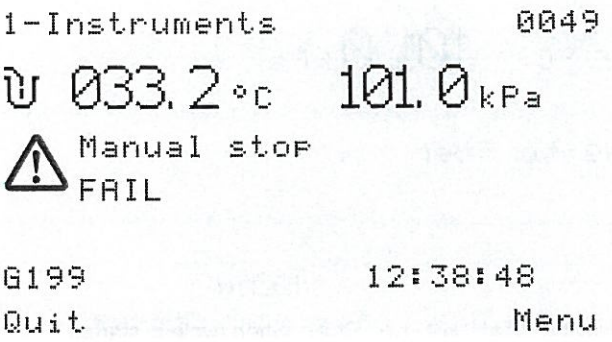


Fig. 23: Display message Manual Stop after user stops cycle

- Confirm the error message by pressing the Quit display key and entering the code for the access level.

After a manual stop, the interrupted autoclave process cannot be continued, but must be started again if desired.

4.6.10 Cycle error

If an error occurs, the "ALARM" LED lights up and a corresponding error message appears in the display.

- Press the Quit display button and enter the code for the corresponding access level.
- Press the Set display key to confirm the error message.

Items possibly not completely sterilized!

Depending on the point at which the sterilization process is interrupted, the sterilization may be incomplete. An interruption in the warm-up or sterilization phase causes the cycle to pass directly to the cool-down phase.
In this case, to guarantee complete sterilization you must repeat the entire sterilization process!

Meaning of the error messages!

If you are not clear about the meaning of an error message and how to resolve the problem, consult chapter 8: "Description of errors".

4.6.11 Opening the door

When the sterilization process is completely finished and the specified unloading temperature and atmospheric conditions have been reached, the message Opening Door appears in the display.

The door can now be opened.

If the sterilization process is stopped prematurely, the error message Manual stop FAIL appears in the display. After you press the Quit display button and enter the code for the corresponding access level, the door can be opened (after the unloading temperature and atmospheric conditions set have been reached).

Danger of burns!

After the sterilization, the surfaces of the door and the autoclave chamber are hot. On opening, hot clouds of steam can escape and lead to scalding.
For this reason, do not pull the door from the front, but always move the door using recessed grip on the side.
Use the prescribed personal protective equipment!

- Press the Open display key.

The door then automatically opens outwards by approx. 3 cm.

- Open the door using the recessed grip until it reaches the stop.

Measuring the water level in the sterilisation chamber after the end of the cycle:

A water level sensor in the sterilization chamber registers the liquid collected in the autoclave. If there is more than 1 litre of water in the chamber at the end of a sterilization cycle, the appliance will prevent the door from being opened. Water remaining in the chamber cannot leak out after, for example, a cycle error and cycle interruption have occurred. The message Drain condense ? appears in the display.

– Appliances without exhaust filter:

After the end of the cycle, the chamber electrode measures whether there is still water in the appliance. If this is the case, the fast exhaust valve is opened and the water is pushed out using compressed air with max. 120 kPa. Subsequently the pressure is released via the exhaust valve and the display shows the message Please wait. Once the chamber reaches atmospheric pressure the door is released. The message Opening door appears in the display.

– Appliances with exhaust filter:

The procedure is the same as for appliances without an exhaust filter, however the start of the condensate draining must be confirmed with the Yes display key, as shown in the display after the message Drain condense ?.

You can decide

- whether the condensate should flow into the drain or
- whether, perhaps owing to a faulty process, the condensate must be drained into a separate container (if necessary with a drain hose feeding into a container), for it to be processed further.

4.6.12 Taking out the autoclaved item

Danger of burns when unloading!

Only take the autoclaved item out of the autoclave with the greatest of care while adhering to all safety prescriptions. When removing the products, wear appropriate protective clothing to avoid being burned.

- If required, remove the flexible temperature sensor from the autoclaved item (reference vessel) and fix it to the holder provided for it in the door.
- Take the autoclaved item from the autoclave chamber and proceed with it as prescribed in your laboratory.

4.7 Parameters

Description of the factory parameter setting!

The parameters for the individual sterilization cycles can be adjusted to suit the individual circumstances in your laboratory. Changed settings must be documented in the appliance log book.
If you are unsure about the parameter setting of the appliance in front of you, inform yourself about it before starting a cycle.

The following descriptions give recommendations that correspond to the normal factory presetting. The parameters described can differ from the actual settings of your autoclave, depending on the options selected and the delivery configuration.

Cycle	SterTemp Sterilization temperature	SterTime Sterilization time	DryTime Drying time (Only with the vacuum device option)	EndTemp Unloading temp.
	[°C]	[min]	[min]	[°C]
1-Instruments	121	20	10	120
2-Instruments	134	10	20	120
3-Instruments	121	20	10	120
4-Waste (Bags)	121	20	0	99
5-Waste (Bags)	134	20	0	99
6-Liquids Waste	121	20	0	80
7-Liquids Waste	121	20	0	80
8-Liquids	121	15	0	80
9-Liquids	121	15	0	80
10-Liquids	121	15	0	80
11-Liquids	121	15	0	80
12-Cleaning	134	1	0	120
13-Vacuum Test	--	--	--	--
14-BD-Test	134	3.5	1	120

Tab. 10: Factory parameter setting

Depending on the risks involved, when setting a parameter you may have to enter the code for a certain access level. A complete description of the parameters that can be adjusted in access levels 1 to 3 can be found in in chapter 04 „Operation".

4.7.1 Viewing parameters saved for the desired cycle

You can view the basic parameters of every cycle in order to check the values.

- From the basic display, use the arrow keys to select the cycle whose parameters you wish to view.
- Press the Menu display key.
- Select View parameters.
- Press the Set display key.

The corresponding parameters for the cycle chosen are shown in the display.

The following values are shown:

SterTemp	Sterilization temperature in °C	See section "Meaning of the individual parameters"
SterTime	Sterilization time in minutes	
DryTime	Drying time in minutes	
Pulses	Pre-vacuum cycles or pulse of the fractionated heating up	
EndTemp	Unloading temperature in °C	

Tab. 11: Basic parameters

Example:

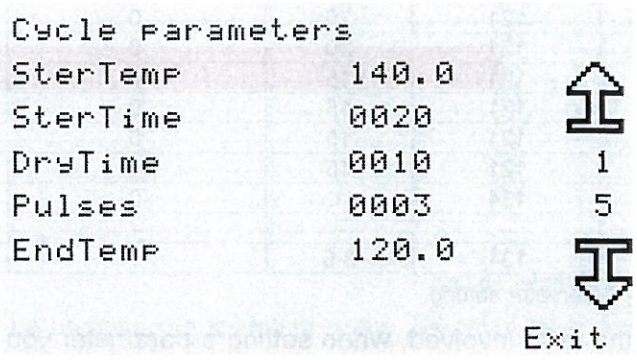


Fig. 24: Display of cycle parameters

- Press the Exit display key to exit the parameter display and return to the basic display.

4.8 Adapting parameters

This section explains the procedure for adapting parameters step-by-step. At the end of the description, a concrete example clarifies the procedure.

Changing the parameters can be dangerous!

The preset cycles of the autoclave can be changed significantly using the parameters, and this may result in danger for the operating personnel or impair the sterilization result.
Changes may only be made by trained personnel and must be documented in the appliance log book.
Systec accepts no responsibility for the improper setting of parameters!

The following steps are necessary:

1. Selecting the cycle
   - Select the cycle whose parameters you wish to adapt.
2. Call the `Cycle parameters` submenu
   - Call up the main menu using the `Menu` display key and select the `Change parameters` menu item there.
   - Enter the code for the access level.

The `Cycle parameters` submenu shows a list of the adjustable parameters in this access level.

3. Selecting and adjusting the desired parameters
   - In the `Cycle parameters` submenu, navigate to the parameter you wish to change.
   - Press the `Set` display key to change to the parameter display of the selected parameter.
   - Adjust the value of the parameter using the arrow keys.

Cancelling changes!

Press the `Exit` display key to cancel your changes. The saved parameter value is not changed, and you leave the parameter display.

- Press the `Save` display key to save your change.

You have now changed the current cycle permanently.

The display changes to the higher-level Cycle parameters menu.

4. Adjusting further parameters and changing back to the basic display
- If you wish, adjust further parameters as described.
- Press the Exit display key to leave the Cycle parameters submenu and change to the main menu.
- Exit the main menu using the Exit display key and change to the basic display.

4.8.1 Example: How to change the parameters of a cycle

- In the basic display, select the desired cycle using the keys ▵ ▿.

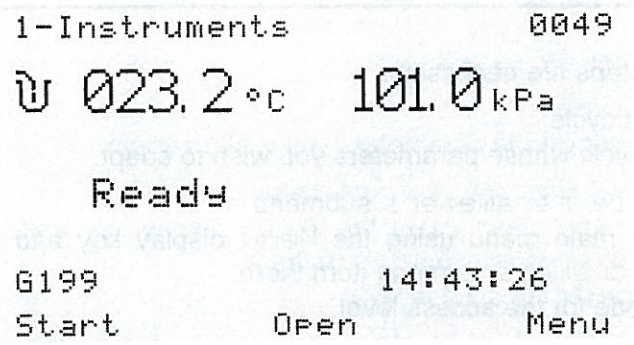


Fig. 25: Adjusting parameters: Basic display showing desired cycle

- Call up the main menu using the Menu display key.

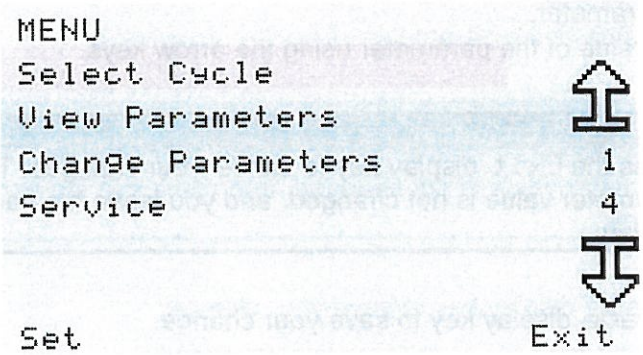


Fig. 26: Adjusting parameters: Main menu

- Use the arrow keys ▵ ▿ to navigate to the Change parameters menu item.

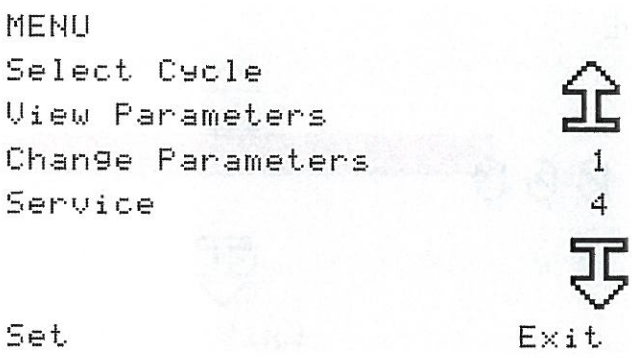


Fig. 27: Adjusting parameters: Select the Change parameters menu item

- Press the Set display key to confirm the entry.

The query for the access level appears. The cursor is on the first digit of the four-digit code.

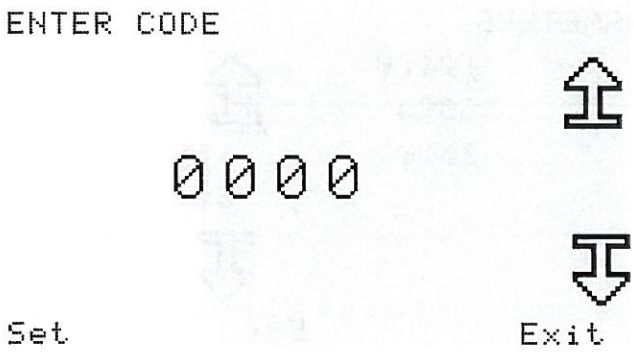


Fig. 28: Adjusting parameters: Query for the access level

- Use the arrow keys ◁ ▷ to navigate to the desired position and enter the numbers of the code using the arrow keys △ ▽.

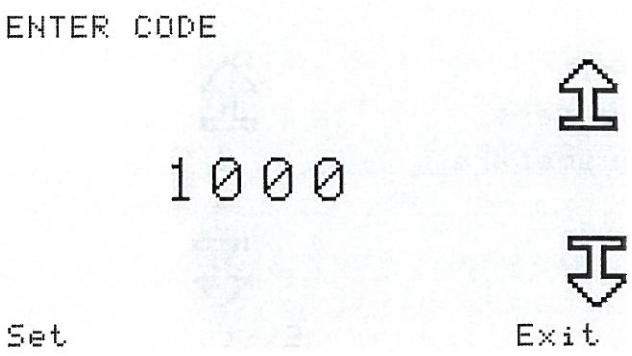


Fig. 29: Adjusting parameters: Entering the access level code (example)

- Press the Set display key to confirm the entry.

The CYCLE PARAMETERS submenu appears with a list of the parameters that are adjustable in the access level entered.

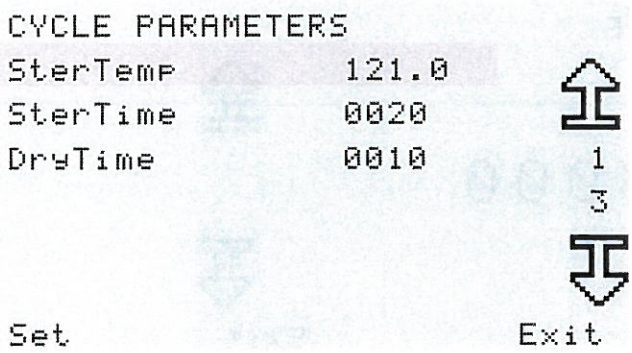


Fig. 30: Adjusting parameters: CYCLE PARAMETERS submenu

- Use the arrow keys ▵ ▿ to navigate to the desired menu item.
- Use the Set display key to select the parameter indicated (here "SterTemp").

The desired parameter is displayed.

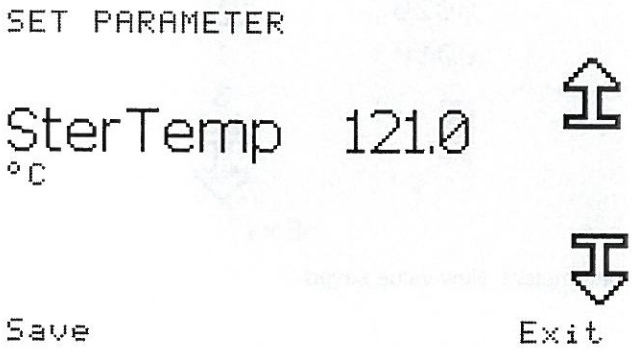


Fig. 31: Adjusting parameters: Display of the value of the parameter to be changed

- Use the ▵ ▿ keys to change the value.

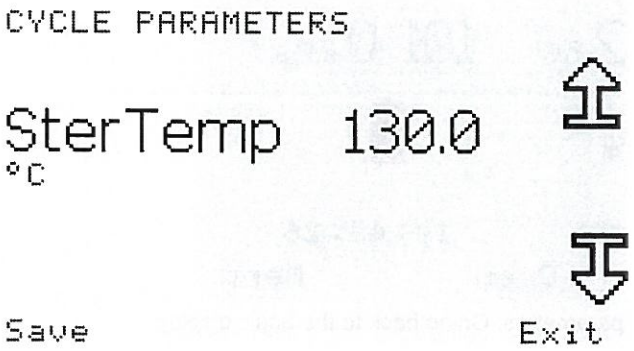


Fig. 32: Adjusting parameters: New value of the parameter being changed

- Press the Save display key to save the changes. The display changes to the higher-level CYCLE PARAMETERS menu.

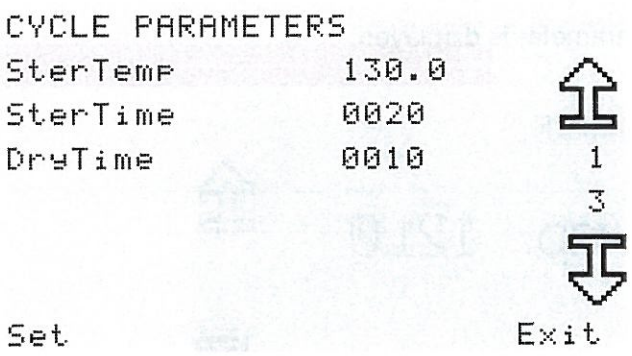


Fig. 33: Adjusting parameters: New value saved

- You can select and adjust further parameters using the ▵ ▿ keys, as described above.
- Press the Exit display key to go to the main menu.
- Press the Exit display key to go to the basic display.

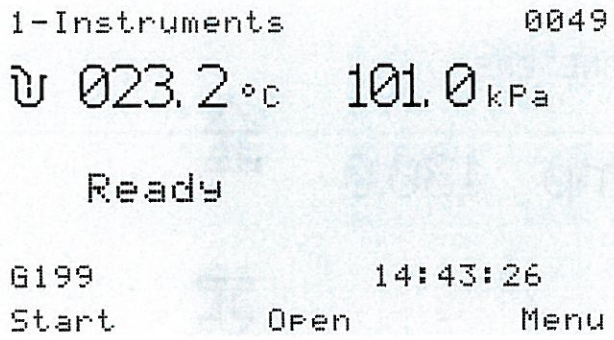


Fig. 34: Adjusting parameters: Going back to the basic display

4.9 Meaning of the individual parameters

You can use the parameters to adjust the function of the autoclave to suit your individual requirements.

Changing the parameters can be dangerous!

The preset cycles of the autoclave can be changed significantly using the parameters, and this may result in danger for the operating personnel or impair the sterilization result.
Changes may only be made by trained personnel and must be documented in the appliance log book.
Systec accepts no responsibility for the improper setting of parameters!

Access level!

You must have access to a certain access level to be able to display and change certain values, as shown in the table below. You access the parameter displays of these values only after entering the corresponding code, as described in the section "Starting the cycle".

You can display and change the following cycle parameters (The usage of some parameters depends on the option installed):

	Name		
	SterTemp		
Description	**Sterilization temperature**		
Access level	Resolution	Minimum value	Maximum value
Level 1	**0.1 °C**	**60 °C**	**140 °C**
	Name		
	SterTime		
Description	**Sterilization time**		
Access level	Resolution	Minimum value	Maximum value
Level 1	**1 min**	**0 min**	**9999 min**

	Name		
	DryTime		
Description	**Drying time** **(Only usable when drying is active)**		
Access level	Resolution	Minimum value	Maximum value
Level 1	**1 min**	**0 min**	**120 min**
	Name		
	SterTimeDays		
Description	**Sterilization time in days**		
Access level	Resolution	Minimum value	Maximum value
Level 1 (4)	**1 day**	**0 days**	**99 days**
	Name		
	EndTemp		
Description	**Unloading temperature** If the temperature in the autoclave or that of the item being sterilized is higher than the value set, the door remains locked and the cycle is not finished.		
Access level	Resolution	Minimum value	Maximum value
Level 2	**1 °C**	**40 °C**	**80 °C** (liquid) **99 °C** (waste) **120 °C** (instrument)
	Name		
	Pulses		
Description	**Number of steam/vacuum pulses** in the pre-vacuum phase With this parameter you can set the number of steam pulses for the pre-vacuum cycles or for the fractionated heating up.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1**	**0**	**7**
	Name		
	PulseVac1		
Description	**Vacuum value of the first vacuum pulse (No. 1)** A value of 100 means: no vacuum pump, fractionated heating up.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10 kPa**	**100 kPa**

	Name		
	PulsVacT1		
Description	**Run-on time of the first vacuum pulse** Defines the time for which the vacuum must be maintained after the vacuum value set "PulseVac1" (No. 7) has been reached.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 s**	**1 s**	**1800 s**
	Name		
	PulsePress 1		
Description	**Level of steam pressure for the first steam pulse**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10 kPa**	**250 kPa**
	Name		
	PulseVac2		
Description	**Vacuum value of the second and subsequent vacuum pulses** A value of 100 means: no vacuum pump, fractionated heating up.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10 kPa**	**100 kPa**
	Name		
	PulseVacT2		
Description	**Vacuum time for the subsequent pulses** Defines the time for which the vacuum must be maintained after the set vacuum value "PulseVac2" (No. 10) has been reached for the second and subsequent pulses.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 s**	**1 s**	**1800 s**
	Name		
	PulsePress 2		
Description	**Level of steam pressure for the second and subsequent steam pulses**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10kPa**	**250 kPa**
	Name		
	PulseVac3		
Description	**Vacuum value of the last vacuum pulse** A value of 100 means: no vacuum pump, fractionated heating up.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10 kPa**	**100 kPa**

	Name		
	PulseVacT3		
Description	**Vacuum value of the last vacuum pulse** Defines the time for which the vacuum must be maintained after the set vacuum value "PulseVac3" (No. 13) has been reached for the last pulse.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 s**	**1 s**	**1800 s**
	Name		
	PulsePress 3		
Description	**Level of steam pressure for the last pulse**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 kPa**	**10 kPa**	**250 kPa**
	Name		
	ExShootOn		
Description	**Clocking of the steam exhaust valve ("on time")** In conjunction with "ExShootOff" (No. 17), the length of time the steam exhaust valve is switched on for can be controlled when using cycles with slow steam exhaust.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1/10 s**	**0 s**	**100 s**
	Name		
	ExShootOff		
Description	**Clocking of the steam exhaust valve ("off time")**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1/10 s**	**0 s**	**100 s**
	Name		
	HoldTemp		
Description	**Hold temperature** Temperature that should be maintained after the sterilization cycle in the pressure container (if "HoldTime" (No. 19) is greater than 0). **Only liquids cycle!**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**0.1 °C**	**40 °C**	**80 °C**

	Name		
	HoldTime		
Description	**Hold time** Length of time for which the product is kept at "HoldTemp" (No. 18) after "EndTemp" (No. 5) has been reached. **0: Function inactive, 1: Time ∞, > 1: Time in minutes**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1 min**	**0**	**300 min**
	Name		
	AutoOpenDoor		
Description	**Automatic opening of the door** Defines whether the door should open automatically at the end of a trouble-free cycle. **0: Door remains locked, 1: Door opens**		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1**	**0**	**1**
	Name		
	Cycle Count		
Description	**Material test** Number of repeating sterilizations for material tests.		
Access level	Resolution	Minimum value	Maximum value
Level 3 (4)	**1**	**0**	**255**
	Name		
	CycleCtr.Time		
Description	**Pause interval** Interval between sterilization cycles if "CycleCounter" (No. 21) is greater than 1.		
Access level	Resolution	Minimum value	Maximum value
Level 3 (4)	**1 min**	**0 min**	**9999 min**
	Name		
	ExternSteam		
Description	**Steam specification** Specifies whether the autoclave is heated with auxiliary steam. **0: Internal steam generator, 1: Auxiliary steam (external)**		
Access level	Resolution	Minimum value	Maximum value
Level 3 (4)	**1**	**0**	**1**

	Name		
	StartByTime		
Description	**Specification of starting time** Enables the setting of a preprogrammed time and date at which a selected sterilization cycle is to be started.		
Access level	Resolution	Minimum value	Maximum value
Level 3	**1**	**0**	**1**
	Name		
	F0 Enable		
Description	Printout of the sterilization time At the end of the cycle, the sterilization time in the heating up and cooling down phases, as calculated according to the FO formula, is printed out. 0 = function inactive 1 = FO values of the heating up, sterilization and cooling down times are printed out on the optional batch printer. 2 = the sterilization time is automatically shortened by the FO times of the heating up and sterilization times. 3 = the sterilization time is automatically shortened by the FO time of the sterilization time and the double FO time of the heating up phase. This is only used if the cooling down time roughly corresponds to the heating up time.		
Access level	Resolution	Minimum value	Maximum value
Level 3 (4)	**1**	**0**	**3**

Tab. 12: Meaning of the individual parameters

5 STERILIZATION CYCLES

Aim of this section

This section gives you an overview of the preset ex-factory cycles and their suitability for certain items being sterilized. An illustrative graph shows the typical pressure and temperature curves for each of the cycles described.

Contents

Diagrams

Tables

5.1 Overview

The following tables give a quick overview of the preset cycles. The parameters described can differ from the actual settings of your autoclave, depending on the options selected and the delivery configuration.

When adjusting cycle settings:

In specific cases, the cycles can be adapted to the particular requirements of your laboratory. We recommend that you enter the changed cycles in the table and, if necessary, add a description of the changed cycles.

Cycle No.	Items to be sterilized	Parameter setting			In combination with
		SterTemp	SterTime	EndTemp	
1	Solids, instruments	121 °C	20 min.	≤ 120 °C	
2	Solids, instruments	134 °C	10 min.	≤ 120 °C	
3	Solids, instruments	121 °C	20 min.	≤ 120 °C	
4	Waste in bags	121 °C	20 min.	≤ 99 °C	
5	Waste in bags	134 °C	20 min.	≤ 99 °C	
6	Liquid waste in containers	121 °C	20 min.	≤ 80 °C	Rapid cooling
7	Liquid waste in containers	121 °C	20 min.	≤ 80 °C	
8 to 10	Liquids	121 °C	15 min.	≤ 80 °C	Rapid cooling
11	Liquids	121 °C	15 min.	≤ 80 °C	
12	Cleaning	134 °C	1 min.	--	
13	Vacuum test	--	--	--	Vacuum device
14	Bowie-Dick test	134 °C	3.5 min.	≤ 120 °C	DX series with vacuum device
Changed cycle settings					

Tab. 1: Overview of the available sterilization cycles

5.2 Cycles 1 to 3: Solids

5.2.1 Applications

Cycles 1-3 are for the sterilization of all kinds of solids, such as instruments, glass and other materials for which the manufacturer recommends sterilization in the autoclave.

5.2.2 Preset parameters

Sterilization temperature	121 / 134 °C
Sterilization time	20 / 10 minutes
Drying time	0 minutes

Tab. 2: Parameters of cycles 1 to 3

5.2.3 Starting the cycle

A solids cycle can only be started after confirmation by the user. After the Start key is pressed, the message No solutions!!! informs you that the cycle is not suitable for the sterilization of liquids. Only after entering the code for access level 1 and pressing the Set key can the cycle be started.

5.2.4 Typical cycles

If a vacuum device is present, a vacuum is created before the heating up process. The user can set the number of vacuum pulses and the time for the drying vacuum.

After the sterilization temperature has been reached, it remains constant for the duration of the specified sterilization time.

After the sterilization period has elapsed, the steam is released rapidly from the chamber until atmospheric pressure has been reached.

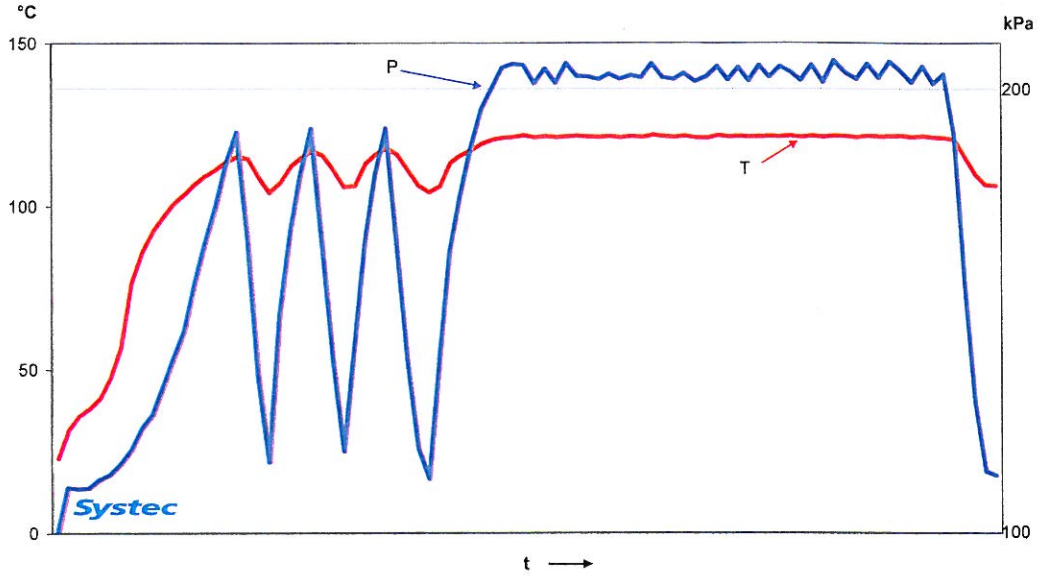


Fig. 1: Graph with typical pressure/temperature curves for cycles 1 to 3
(in this example with triple fractionated heating up)
P: pressure curve, T: temperature curve, t: time

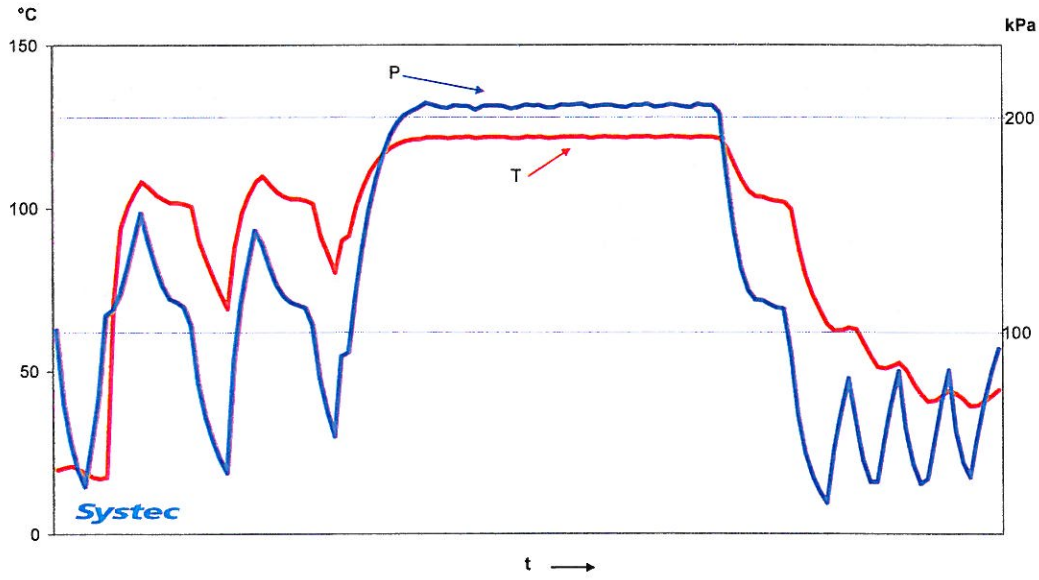


Fig. 2: Only DX series: Graph with typical pressure/temperature curves for cycles 1 to 3
(in this example with triple fractionated pre-vacuum)
P: pressure curve, T: temperature curve, t: time

5.3 Cycles 4 and 5: Waste in bags

5.3.1 Applications

Cycles 4-5 are used for the sterilization of normal laboratory waste in bags (solid waste with low liquid content).

5.3.2 Preset parameters

Sterilization temperature	121 / 134 °C
Sterilization time	20 minutes
Unloading temperature	99 °C

Tab. 3: Parameters of cycles 4 and 5

5.3.3 Typical cycle

If a vacuum device is present, a triple pre-vacuum is created before the heating process. If there is no vacuum device, fractionated heating is performed in the heating up phase.

After the sterilization temperature has been reached, it remains constant for the duration of the specified sterilization time.

After the sterilization period has elapsed, the steam is released rapidly from the chamber until atmospheric pressure has been reached.

If a vacuum device is present, a post-vacuum of 50 kPa and ≈ 80 °C is created.

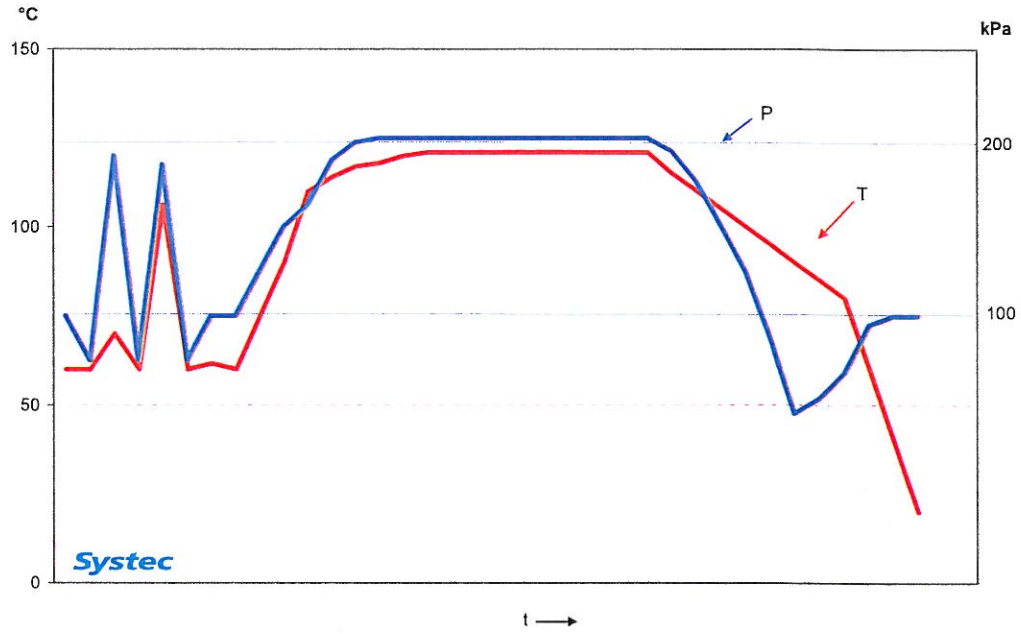


Fig. 3: Graph with typical pressure/temperature curves for cycles 4 and 5
(Here with triple pulsating heating-up)
P: pressure curve, T: temperature curve, t: time

5.4 Cycles 6 and 7: Liquid waste

5.4.1 Applications

Cycles 6-7 are used for the destruction of liquid laboratory waste in bottles or vessels.

Use the flexible temperature sensor!

For the sterilization of liquids, an autoclave with a temperature-dependent door lock is required.
The flexible temperature sensor must therefore be placed in the liquid or in a reference vessel. The reference vessel should have the same size and fill volume as the vessel containing the liquid to be sterilized.

Not suitable for the sterilization of liquids in tightly-shut vessels!

Liquids in closed vessels are only to be sterilized in cycles with rapid cooling and support pressure supply.
Make sure that the vessels to be sterilized are under no circumstances tightly-shut!

5.4.2 Preset parameters

Sterilization temperature	121 °C
Sterilization time	20 minutes
Unloading temperature	80 °C

Tab. 4: Parameters of cycles 6 and 7

5.4.3 Typical cycle

As soon as the steam generator has built up the required steam pressure, the steam flows into the sterilization chamber.

After the sterilization temperature has been reached, it remains constant for the duration of the specified sterilization time.

After the sterilization period has elapsed, cycle 6 with the optional built-in cooling apparatus is cooled down until the unloading temperature has been reached.

In cycle 7, cooling down to unloading temperature occurs in the conventional way. However, if there is no support pressure supply, active cooling is also used here.

Observe the safety instructions!

It is absolutely necessary to observe the safety instructions given in chapter 6: "Options" with regard to the built-in cooling apparatus.

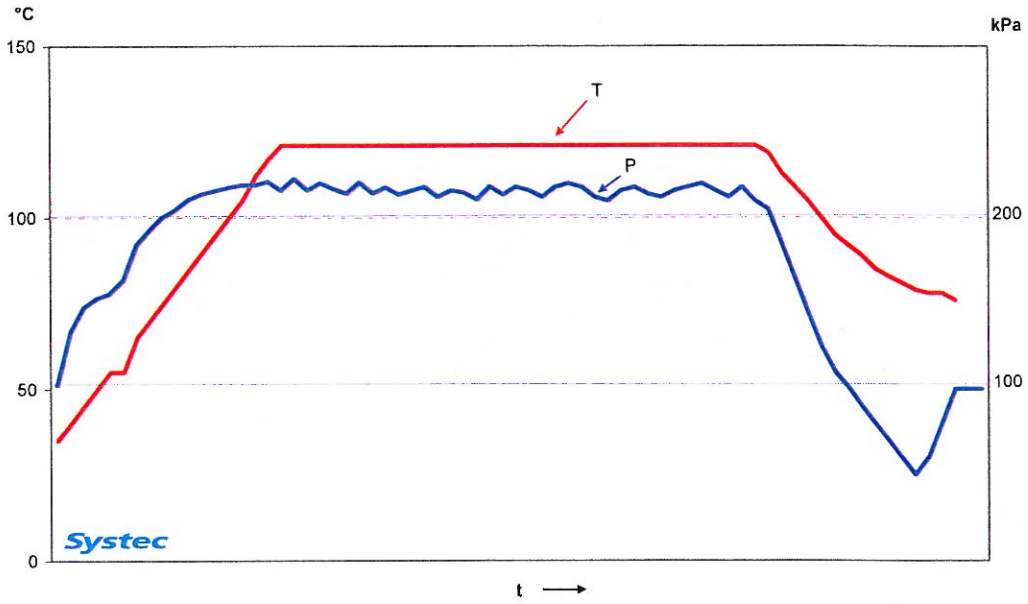


Fig. 4: Graph with typical pressure/temperature curves for cycles 6 and 7
P: pressure curve, T: temperature curve, t: time

5.5 Cycles 8 to 10: Liquids

5.5.1 Applications

Cycles 8-10 are used for the sterilization of liquids in suitable vessels.

Use the flexible temperature sensor!

For the sterilization of liquids, an autoclave with a temperature-dependent door lock is required.
The flexible temperature sensor must therefore be placed in the liquid or in a reference vessel. The reference vessel should have the same size and fill volume as the vessel containing the liquid to be sterilized.

Not suitable for the sterilization of liquids in tightly-shut vessels!

Liquids in closed vessels are only to be sterilized in cycles with rapid cooling and support pressure supply.
Make sure that the vessels to be sterilized are under no circumstances tightly-shut!

5.5.2 Preset parameters

Sterilization temperature	121 °C
Sterilization time	15 minutes
Unloading temperature	80 °C

Tab. 5: Parameters of cycles 8 to 10

5.5.3 Typical cycle

As soon as the steam generator has built up the required steam pressure, the steam flows into the sterilization chamber.

After the sterilization temperature has been reached, it then remains constant for the duration of the sterilization period.

After the sterilization period has elapsed, cycles 8 to 10 with the optional in-built cooling apparatus are cooled down until the unloading temperature has been reached.

Observe the safety instructions!

It is absolutely necessary to observe the safety instructions given in chapter 6: "Options" with regard to the built-in cooling apparatus.

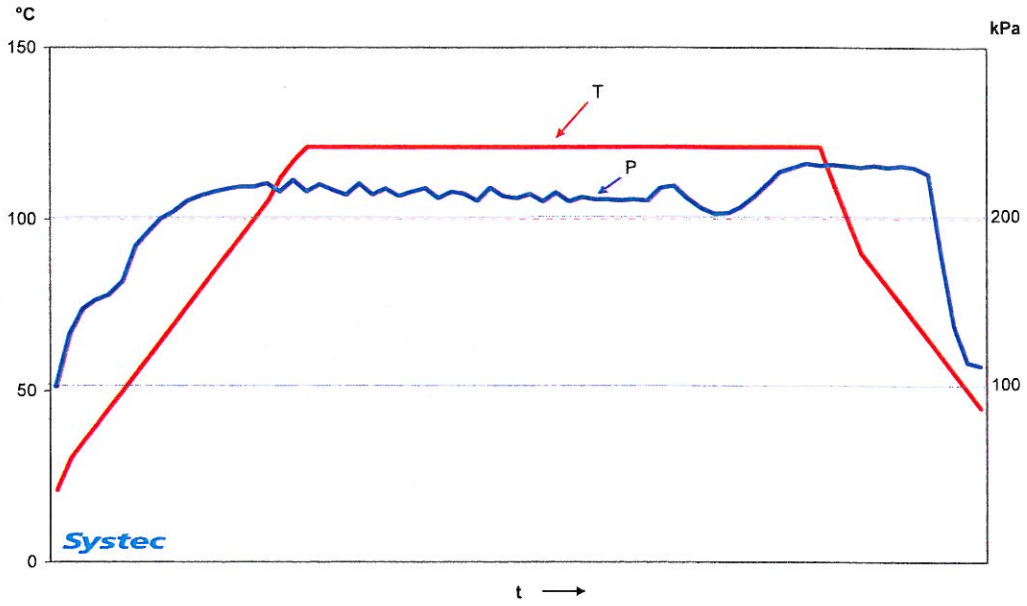


Fig. 5: Graph with typical pressure/temperature curves for cycles 8 to 10 with the option "Quick cooling with support pressure"
P: pressure curve, T: temperature curve, t: time

5.6 Cycle 11: Liquids

5.6.1 Applications

Cycle 11 is used for the sterilization of liquids in suitable vessels.

Use the flexible temperature sensor!

For the sterilization of liquids, an autoclave with a temperature-dependent door lock is required.
The flexible temperature sensor must therefore be placed in the liquid or in a reference vessel. The reference vessel should have the same size and fill volume as the vessel containing the liquid to be sterilized.

Not suitable for the sterilization of liquids in tightly-shut vessels!

Liquids in closed vessels are only to be sterilized in cycles with rapid cooling and support pressure supply.
Make sure that the vessels to be sterilized are under no circumstances tightly-shut!

5.6.2 Preset parameters

Sterilization temperature	121 °C
Sterilization time	20 minutes
Unloading temperature	80 °C

Tab. 6: Parameters of cycle 11

5.6.3 Typical cycle

Warm-up until the sterilization temperature has been reached.

After the sterilization temperature has been reached, it remains constant for the duration of the specified sterilization time.

After the sterilization period has elapsed, cooling down to unloading temperature in cycle 11 occurs in the conventional way. However, if there is no support pressure supply, active cooling is also used here.

Observe the safety instructions!

It is absolutely necessary to observe the safety instructions given in chapter 6: "Options" with regard to the built-in cooling apparatus.

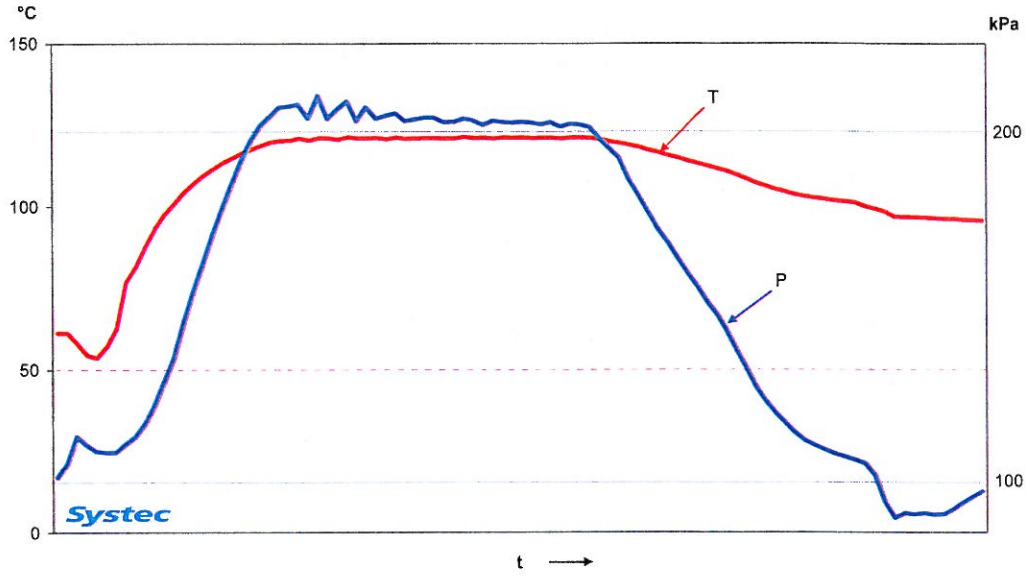


Fig. 6: Graph with typical pressure/temperature curves for cycle 11
P: pressure curve, T: temperature curve, t: time

5.7 Cycle 12: Cleaning

5.7.1 Applications

Cycle 12 is used for cleaning the autoclave. To do this, the autoclave heats up to a temperature of 134 °C and sterilizes the interior for one minute.

5.7.2 Preset parameters

Sterilization temperature	134 °C
Sterilization time	1 minute
Unloading temperature	120 °C

Tab. 7: Parameters of cycle 12

5.7.3 Typical cycle

Warm-up until the sterilization temperature has been reached.

After the sterilization temperature has been reached, it remains constant for the duration of the specified sterilization time.

After the sterilization period has elapsed, the steam is released rapidly from the chamber until atmospheric pressure has been reached.

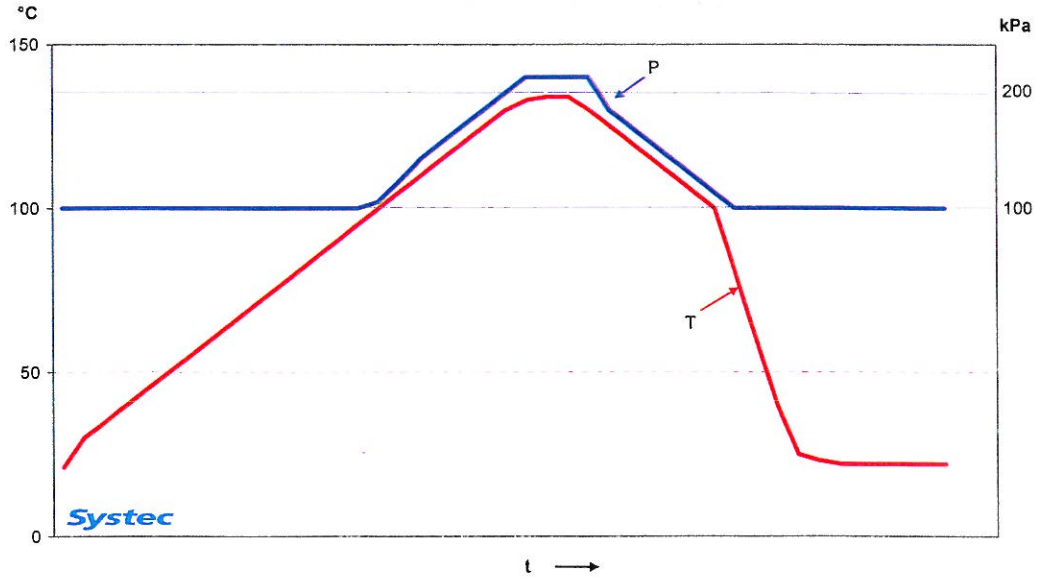


Fig. 7: Graph with typical pressure/temperature curves for cycle 12
P: pressure curve, T: temperature curve, t: time

5.8 Cycle 13: Vacuum test

5.8.1 Applications

This cycle can only be performed if the autoclave is equipped with a vacuum device and this is activated.

The vacuum test is used for testing the leak-proofness of the autoclave.

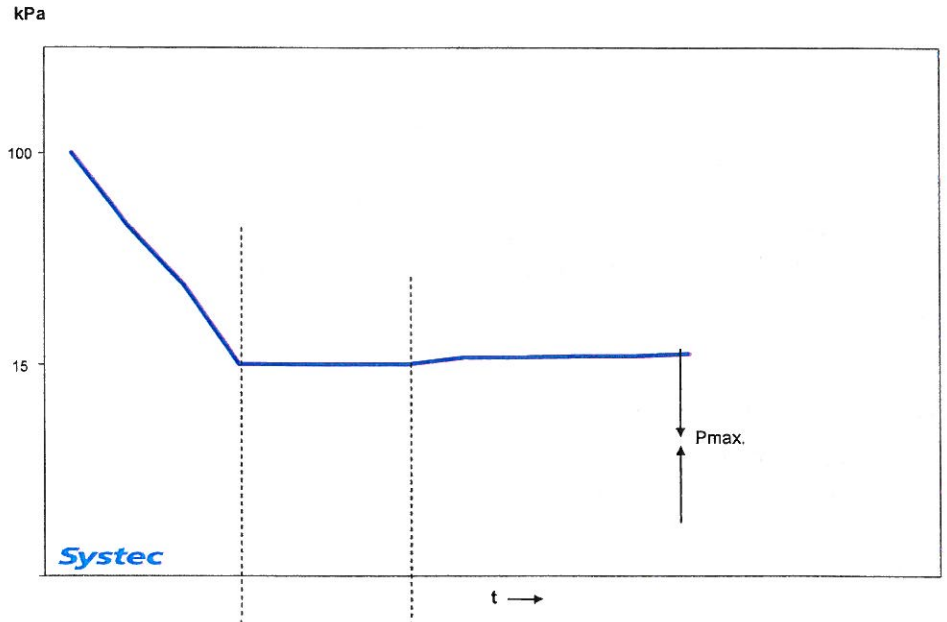
5.8.2 Cycle procedure

The sterilization chamber must be cold and dry!

The basic prerequisite for the performance of a vacuum test is that the sterilization chamber is approximately at room temperature when starting the cycle and that it is dry.

The vacuum pump operates until a pressure of 15 kPa (150 mbar) has been reached. Then all valves close and the vacuum pump switches off.

The following five minutes serve to stabilize the pressure in the sterilization chamber, after which the pressure may rise by a maximum of 1.3 kPa (13 mbar) within 10 minutes.



Create vacuum	Stabilising	Test time	Δ Pmax.
Vacuum pump = on	Pump = off Valve = closed 5 min	Measuring of pressure difference 10 min	1.3 kPa (13 mbar)

Fig. 8: Graph with a typical pressure curve for cycle 13
t: time

5.9 Cycle 14: Bowie-Dick test

5.9.1 Applications

This cycle can only be performed with the DX series with a vacuum device.

The Bowie-Dick test is used, in accordance with EN285, to test the effective air extraction of the autoclave. If the Bowie-Dick test has been passed, this indicates a rapid and consistent penetration of steam into the test pack.

5.9.2 Cycle procedure

The vacuum device evacuates in five pulses until a pressure of 15 kPa (150 mbar) has been reached for each one. Then the autoclave heats up to a temperature of 134 °C.

After 3.5 minutes, rapid steam expulsion is performed.

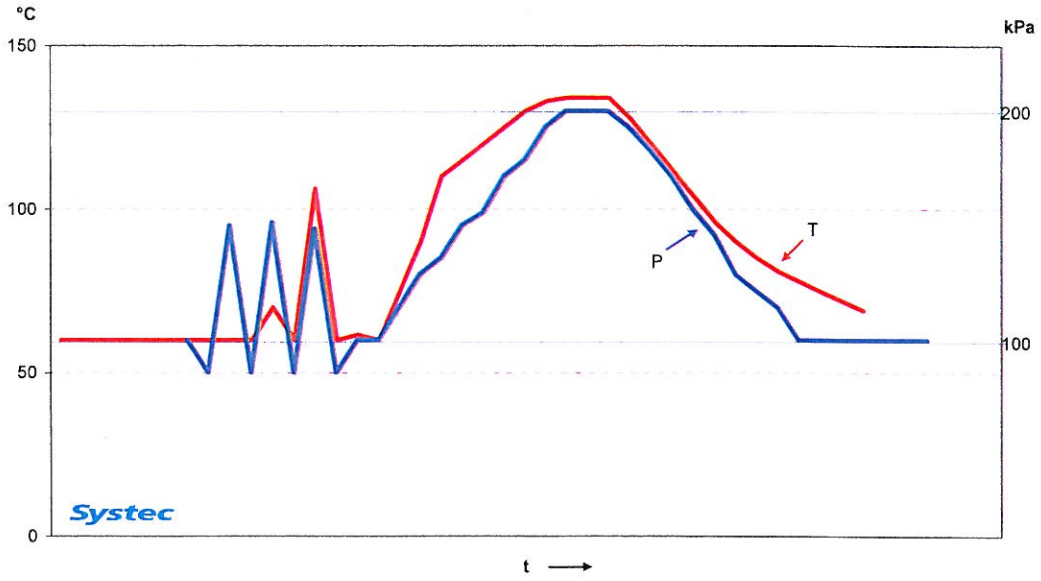


Fig. 9: Graph with typical pressure/temperature curves for cycle 14
P: pressure curve, T: temperature curve, t: time

6 OPTIONS

Aim of this section

This section describes the options provided to you by Systec GmbH.

If you have ordered an appliance with options, these are already integrated into the appliance.

However, purchasable options can also be retrofitted, e.g. if you wish to change your application.

Cooling systems can be combined to suit your application!

Some of the cooling system options described in the following can be combined with each other.
Please contact Systec GmbH to evaluate a cooling system optimally adapted to your application.

Contents

6.1 Quick cooling with cooling water

6.1.1 Quick cooling with cooling water only for open vessels, without support air

Not suitable for the sterilization of liquids in tightly-shut vessels!

Liquids in closed vessels are only to be sterilized in cycles with rapid cooling and support pressure.
Make sure that the vessels to be sterilized are under no circumstances tightly-shut!

Water hardness maximum 11° German hardness!

To avoid calcification in the helical tube, the total quantity of alkaline earth ions may not exceed 2 mmol/l. This corresponds to a total hardness of 11° German hardness. Water softening equipment may be required. In this case, please contact Systec GmbH.

Loss of liquid!

The loss of liquid in the item being sterilized during rapid cooling with cooling water but without support pressure amounts to < 5%.

Operating principle:

After the sterilisation phase has ended, the steam will be slowly released. If a temperature of 100 °C and a pressure of approx. 100 kPa has been reached, the helical tubes around the sterilization chamber are flooded with cooling water and the sterilization chamber is aired with sterile-filtered air until the unloading temperature has been reached.

By means of rapid cooling with cooling water, the cooling periods are reduced by approx. 70% in comparison to normal cooling.

6.1.2 Quick cooling with cooling water, without loss of liquid in the sterilised goods for open and hermetically closed vessels, with support pressure by sterile filtered compressed air

Only conventional cooling down if support pressure supply fails!

For the support pressure supply, there must be sufficient oil-free, dehydrated compressed air (approx. chamber volume x 2 l/min).

Water hardness maximum 11° German hardness!

To avoid calcification in the helical tube, the total quantity of alkaline earth ions may not exceed 2 mmol/l. This corresponds to a total hardness of 11° German hardness. Water softening equipment may be required. In this case, please contact Systec GmbH.

Suitable for the sterilization of tightly-shut vessels!

Due to the support pressure supply, this type of rapid cooling is also suitable for the sterilization of liquids in shut vessels.

Loss of liquid!

The loss of liquid in the item being sterilized during rapid cooling with cooling water and support pressure amounts to < 1%.

Operating principle:

After the sterilization phase has ended, the steam in the chamber is replaced with sterile-filtered compressed air (support pressure) and the helical tubes are immediately flooded with cooling water. After the unloading temperature is reached, the auxiliary compressed air is vented and atmospheric conditions are attained.

By means of rapid cooling with cooling water, the cooling periods are reduced by approx. 70% in comparison to normal cooling.

6.2 Accelerated cooling via ambient air ventilation, only for open vessels, without support pressure

Not suitable for the sterilization of liquids in tightly-shut vessels!

Liquids in closed vessels are only to be sterilized in cycles with rapid cooling and support pressure.
Make sure that the vessels to be sterilized are under no circumstances tightly-shut!

Danger of problems caused by the boiling over of easily-foaming substances!

For substances that tend to form foam, boiling over can result in a considerable loss. As a consequence, the autoclave can be damaged by some of the substance remaining in the tubes and connections.
For the sterilization of easily-foaming substances, rapid cooling with support pressure is recommended!

Loss of liquid!

Loss of liquid in items being sterilized with air cooling with inside-air ventilation amounts to < 7%.

Operating principle:

After the sterilisation phase has ended, the steam is released in a controlled way. The speed at which the steam is released can be set by means of the "ExShootOn" and "ExShootOff" parameters in steps of 0.1 seconds.

When a pressure of approx. 110 kPa has been reached, the chamber is efficiently cooled with inside air by be aired with a ventilator. This causes a partial vacuum in the sterilization chamber. When the unloading temperature has been reached, the sterilisation chamber is ventilated with sterile-filtered air, and atmospheric pressure is attained.

The time saved in the cooling phase, in comparison to normal cooling, is approx. 70%.

6.3 Spray cooling by recirculation of sterile water and recooling by heat exchanger with sterile filtered compressed air

Protect the items being sterilized against cooling water!

Spray cooling is only suitable for the sterilization of tightly-shut or covered items.
To cover open items being sterilized, a laminar sheet is available.

Operating principle:

After the sterilization phase, the steam in the sterilization chamber is replaced by compressed air.

The sterilized feed water is cooled via a plate heat exchanger with cooling water and sprayed over the item being sterilized via a nozzle.

The time saved in the cooling phase, in comparison to normal cooling, is approx. 90%.

6.4 Vacuum device with a water ring vacuum pump for a simple and fractionated pre-vacuum

The vacuum device is used to generate the pre- and post-vacuums. It is absolutely essential for the safe sterilization of porous substances and hollow objects (e.g. tubes).

Operating principle:

Before the heating-up phase starts, a vacuum is created, evacuating the air from the items to be sterilised. This ensures that steam completely penetrates any cavities, and avoids the formation of air pockets. The factory setting is a triple vacuum.

Once atmospheric conditions have been reached after the sterilisation phase is complete, a post-vacuum is generated to dry the sterilised items. Irritation caused by odour generated during sterilisation is minimised.

Parameter setting:

Code for access level 3, parameter pulses:

- No pre-vacuum = 0
- Simple pre-vacuum = 1
- Triple pre-vacuum = 3

6.5 Superdry (only DX series)

The Superdry option is used to reduce the condensation in the heating-up phase, and it supports the drying process. Condensation is reduced considerably if the autoclave is filled and closed approx. 15 minutes before the cycle starts.

6.6 Air exhaust filtration

This system is required when sterilising infectious material.

Ensure that the filter cartridges used are sterile!

We recommend that you replace the exhaust filter cartridges after approx. 150 cycles.
After replacing them, used exhaust filter cartridges must be re-sterilized separately!

Observe the work and safety regulations!

During the sterilization of infectious material, non-sterile condensate can be left behind in the autoclave chamber if the process is not completed successfully. For this reason, you must adhere to the work and safety regulations applicable on site.

Operating principle:

Air leaving the autoclave during the heating up and sterilization phases is passed through an exhaust filter cartridge and thus filtered. The exhaust filter cartridge is also sterilised during the sterilization phase.

Replacing the exhaust filter cartridge: see chapter 07.

Safe condensate drainage

The accumulated condensate can only be let out into the drain when it is certain that the sterilisation cycle has been successfully completed.

If the process was not completed successfully, the condensate is not drained off automatically, but rather the message `Drain condense ?` appears at the end of the cycle.

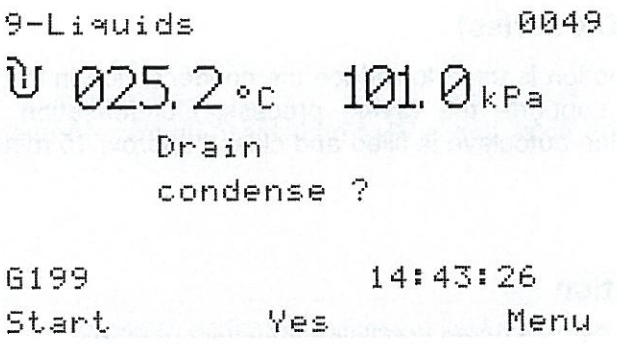


Fig. 1: Exhaust filter: Message: Drain condense?

Now you can collect any potentially contaminated water in a separate container and process it accordingly:

- Press the YES display key.
- Enter the code for the corresponding access level.

This message appears in the display: Drain Condense ? and the condensate is drained off. Then the autoclave returns to the basic display.

You can repeat the autoclave process or start another process:

- Press the Start display key or select a cycle using Menu.

6.6.1 Additional temperature sensor for the exhaust filter

In connection with exhaust filtration, an additional temperature sensor is built into the exhaust filter.

Operating principle:

The sterilization process only begins when the sterilization temperature has been reached in the chamber and in the sensor in the filter. This sensor is also active in the controlling process. Thus, the sterilization of the filter cartridge is guaranteed over the entire sterilization period.

6.7 Durham programme

The Durham cycle is used to prepare Durham tubes.

The air is removed from the fermentation tubes during the sterilization process.

6.8 Agar dissolution programme

The Agar dissolution cycle is used to remove pre-sterilized nutrient media.

The max. process temperature (SterTemp) that can be set is 101 °C, and the unloading temperature 99 °C.

The steam pot cycle is not suitable for sterilizing.

6.9 Steam-air mixture option or hot water sprinkling option

Operating principle:

Sterilisation of liquids in closed vessels, plastic bottles, bags, tins, blister packaging, food packaging etc. As a steam-air mixture prevails in closed vessels, these options make it possible to create a similar atmosphere in the sterilisation chamber and effectively prevent damage or deformation to the vessels.

By setting an appropriate auxiliary pressure for the entire process, the pressure in the sterilization chamber is adjusted to the prevailing pressure in the vessels.

To do this, the temperature in the reference vessel is measured using a temperature sensor. The steam pressure that corresponds to the temperature measured is increased by an adjustable factor. The adjustment is made by modifying the CoolPressF parameter (1.0 to 3.0 times the corresponding steam pressure in percent accordingly).

The total pressure is limited to 5.0 bar (500 kPa) absolute pressure. The prerequisite is a compressed air supply with sufficient positive pressure.

The safety valve may open at 450 kPA!

The safety valve opens at a tolerance of +/– 10%, generally at higher rather than lower temperatures. Therefore, under sterilisation conditions, it already opens at 450 kPA.
If required, the safety valve can be thermally insulated to prevent this from occurring.

Homogeneous temperature distribution in the sterilisation chamber:

A radial fan is also installed in the sterilisation chamber for homogeneous temperature distribution. It circulates the steam-air mixture constantly throughout the entire process.

The installation of this radial fan does **not** reduce the depth of the chamber in autoclaves with a chamber volume of ≥ 65 l. For autoclaves with a chamber volume of less than 65 l, the chamber depth is reduced by 50 mm.

For the hot water sprinkling option, a circulating pump is installed for homogenous temperature distribution.

Setting parameters:

The following parameters can be set for this option:

No.	Parameter	Description	Access level	Setting range	Default setting
31	Temp2Val	Maximum temperature in the heating phase. Measured by an additional temperature sensor.	3	1–10 °C	2 °C higher than the sterilisation temperature
36	HeatGenPrsF	Increased steam pressure in the steam generator during the heating phase. HeatGenPrsF = CoolPrsF + 20 – 100	3	0–300 %	100 %
37	SterGenPrsF	Increased steam pressure in the steam generator during the sterilisation phase. SterGenPrsF = CoolPrsF + 10 – 100	3	0–300 %	100 %
38	CoolPressF (Cycle 35)	Auxiliary pressure during the cooling phase corresponding to the set sterilisation temperature.	3	0–300 %	Cycle dependent
39	CoolMinPress (Cycle 38)	Defines whether "minimal" auxiliary compressed air pressure should remain in the chamber until the end of the program.	3	100–300 kPa	Cycle dependent

Service telephone number: +49 (0)641 982120

Please contact Systec service if you have any questions about setting the parameters required for a particular process or about the positioning of the temperature sensor in the reference vessel.

6.10 Printer

The autoclave can also be equipped with a printer to document parameters while a cycle is running.

Note!

If you have ordered an appliance with a printer, the printer is already integrated into the appliance.
However, the printer can also be retrofitted.

Never use the printer without paper!

Only use the manufacturer's original paper rolls (58 mm in width). The last metre of the paper roll is indicated by a red stripe.

Protect the printouts from direct sunlight!

Although printed on normal paper, direct sunlight can fade the print.

The printer starts automatically and logs the following parameters during the execution of the cycle.

Header data:

- Real time and date (at the beginning and end of the log)
- Software version and serial number
- Cycle number
- Selected cycle
- Preselected sterilization temperature
- Preselected sterilization time
- Steam exhaust mode
- Unloading temperature
- Blank field for operator's signature
- Current log time with data on the phase, sterilization temperature and pressure
- Minimum temperature reached during the sterilization cycle
- Maximum temperature reached during the sterilization cycle

Cycle procedure:

In each line the respective phase is displayed by means of the corresponding symbol, as shown in this table:

International		German	
W	Water inlet	W	Wasserzufuhr
P	Pulses	P	Pulse
H	Heating	H	Heizen
S	Sterilization	S	Sterilisieren
E	Exhaust	A	Ablass
D	Drying	T	Trocknen
C	Cooling	K	Kühlung

Tab. 1: Printer symbols for the documentation of the cycle procedure

Symbols:
- The beginning of a phase is symbolised by a capital letter
- All data recorded within this phase is symbolised by a small letter

For each phase:
- The time elapsed (in minutes and seconds) since the beginning of the cycle
- The current temperature and pressure

End of the cycle:

At the end of the cycle the following message appears:

Cycle ended

Error message

If the cycle has not been completed correctly, e.g. because of a premature termination or an error, Cycle failed appears with the corresponding error message.

Footer:

The following data is also provided at the end of the cycle:
- Blank field for operator's signature
- Current log time with data on the phase, sterilization temperature and pressure
- Minimum temperature reached during the sterilization cycle

– Maximum temperature reached during the sterilization cycle

6.10.1 Replacing paper and ribbon

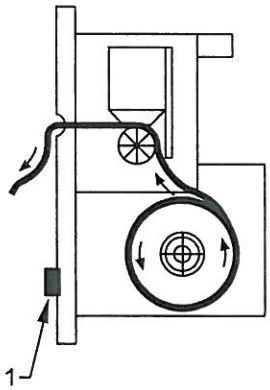


Fig. 2: Feeding the printer

1 = Key for paper transport (LF)

The paper is inserted as follows:

Never pull the paper manually out of the guide slot!

To feed the paper always press the "LF" key.

The paper must roll off backwards!

Mount the axle as shown on the sticker in the paper drawer. The side of the axle with the paper feed must be either on the right or the left.

Close the printer and thread the edge of the paper through the slot in the cover.

1. Withdrawing the paper:
   - Open the door and take out the empty roll with the axle.
2. Feeding paper into the printer:
   - Cut off the start of the paper in a straight line.
   - Feed the start of the paper into the printer.
   - Press the green "FEED" key and hold it down until the paper has been pulled in about 30 mm.

The edge of the paper is clearly sticking out of the printer.

3. Inserting the paper:
   - Put the new paper roll on the axle.
   - Insert the axle into the gap provided in the housing until the axle audibly clicks into place.

4. Closing the printer:
- Insert the paper through the slot in the lid.
- Close the lid.

Changing the ribbon:

1. Take out the ribbon:
- Open the cover of the printer.
- Press down on the right side of the ribbon cartridge.

The ribbon cartridge swings forward and can be taken out.

2. Insert ribbon
- Tighten the ribbon by turning the grooved wheel in the direction of the arrow.
- Put the ribbon cartridge on the holder.
- Pull out the strips of paper through the ribbon cartridge and ribbon.

Insert the cartridge by pressing gently.

6.11 Aquastop

The "Aquastop" option is an additional safeguard against water damage.

Observe the operating instructions!

Observe the safety instructions supplied with the device. We also recommend that you regularly check that the device is functioning properly.

6.12 Repeat mode

This mode enables the user to have a selected cycle repeat automatically up to 99 times via the "CycCtr" function. A pause period between the individual cycle procedures can also be set.

Parameter setting:

Code for access level 3, parameter CycCtr
- No repetition = 0
- Number of cycles = 1...99

Code for access level 3, parameter CycCtr.Time
- No pause period = 0
- Pause period (standby) = 1....1500 minutes

6.13 PC software

The PC software enables the documentation, programming and controlling of the autoclave via a PC.

Information material at Systec GmbH

We also have separate information material about the PC software. If interested, simply request it from us!

7 MAINTENANCE, CLEANING, CARE

Aim of this section

This section gives you an overview of the maintenance and care measures to be regularly carried out.

Contents

Diagrams

7.1 The obligations of the operator

The operator of an autoclave is obliged to
- instruct the user on operation and safety regulations and, if required, to reinstruct them at regular intervals
- keep the autoclave in a faultless condition with regard to safety
- stop using the autoclave as soon as any safety deficiency is detected
- observe all safety regulations and guidelines applying to the autoclave and the environment in which it is operated

7.2 Preventive measures

The maintenance and care tasks described in this section must be carried out at regular intervals. This guarantees that
- the good working order and reliability of the appliance is maintained
- errors and defects are recognised early
- the service life of the appliance is maximised

The prescribed tasks can be quickly and easily carried out by the user or by technical personnel.

Ensure that the autoclave is pressure-free and is disconnected from the supply!

Before every maintenance or care activity, ensure that the sterilization chamber is pressureless, and disconnect the autoclave from the mains supply.

7.3 Upkeep of the autoclave

Do not use a corrosive cleaning agent!

Never use steel wool or wire brushes for cleaning, as they scratch the surface and can do long-term damage to the autoclave.
As a cleaning agent, we recommend you use, for example, citric acid, of which approx. 25-30 ml should be dissolved in a litre of water.
Clean the outside surfaces of the autoclave with a soft cloth.

7.3.1 Daily upkeep of the autoclave

- Clean the gasket with a soft cloth.
- Clean the bearing faces (collar on which the door closes, door) with a soft cloth.

7.3.2 Weekly upkeep of the autoclave

- Remove the baskets or other vessels from the autoclave.
- Clean the interior of the autoclave and the baskets with a mild cleaning agent and water. Use only a soft cloth or a sponge.

Clean the water level electrodes!

To prevent incorrect measurement results, pay particular attention to the cleaning of the water level electrodes (Fig. 1) in the sterilisation chamber: one in the DX Series, two in the DE Series.

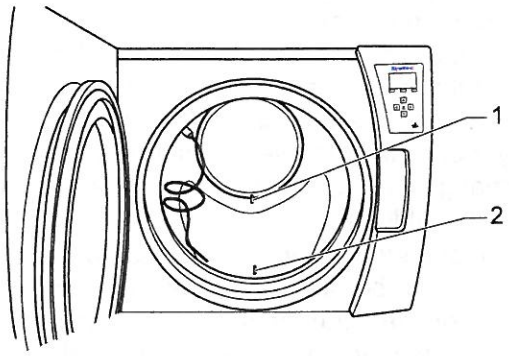


Fig. 1: Location of water level electrodes and dirt strainer (fig. shows DX appliance)

Pos.	DX appliances	DE appliances
1	Dirt strainer	Two water level electrodes
2	One water level electrode	Dirt strainer

Tab. 1: Location of water level electrodes and dirt strainer in DX and DE Series

Water level electrodes and dirt strainer in DE appliances

With DE appliances, you will find two water level electrodes in the rear of the sterilization chamber and the dirt strainer in the front behind the barrier.

- If required: carry out the cleaning cycle.

7.4 Maintenance tasks to be carried out regularly

- Always carry out the sterilization cycles in accordance with the operating manual.
- Test the condition of the supply lines of the autoclave at regular intervals for cracks or possible mechanical damage. After the end of a sterilization cycle, close all the valves and taps of the supply cables, such as those for cooling water and compressed air.
- The autoclave is equipped with 2 safety valves: one is located at the steam generator, the other at the sterilization chamber. As long as the autoclave is regularly inspected (at least once a year) by an authorized customer service agent, the preventive relieving of the valves is not necessary. If for any reason the need should arise, the casings of the autoclave should be taken off and the now accessible safety valves should be relieved by turning the finger screws to the left. Afterwards, the finger screws should be screwed back in the opposite direction until tight. It is absolutely necessary to wear suitable protective clothing (safety goggles, thermal gloves, etc.). Attention: When the appliance is hot, there is a danger of scalding!
- All autoclaves have a dirt strainer in the interior of the sterilisation chamber. The strainer can be taken out without using tools and cleaned. The condition of the strainer should be inspected regularly (ideally once a week) and any dirt should be immediately cleaned off.
- To avoid damage to the flexible temperature sensor (PT100), it should be placed in the holder integrated into the sterilization chamber as soon as the door is opened.

Fig. 2: Dirt strainer

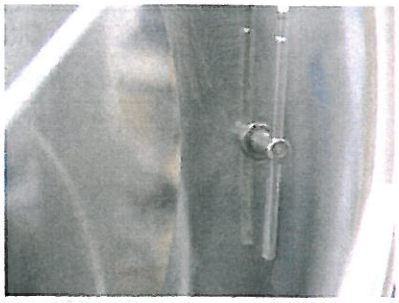


Fig. 3: Holder for the flexible temperature sensor

7.5 Replacing the exhaust filter cartridge

If an exhaust filter cartridge is installed, it should be replaced after approx. 150 sterilization cycles.

The message Repl. Filter appears in the display at the appropriate time.

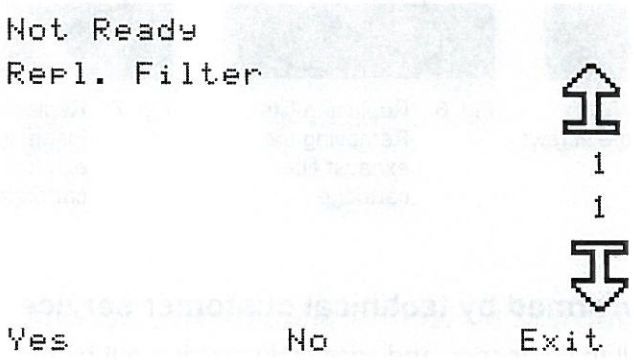


Fig. 4: Filter replacement message

- Press the No display key. The selected cycle starts and the cycle counter continues counting. The message Repl. Filter now appears every time a cycle is started.
- Press the Yes display key: The exhaust filter cartridge is replaced as described here. The cycle counter is reset to 0. You confirm the filter change by entering the code for access level 1.

Replacement

The exhaust filter cartridge is placed in a filter housing at the front left and is sealed by means of a white plastic covering.

Safety measures during replacement!

Wear protective clothing and dispose of the exhaust filter cartridge in accordance with the working and safety regulations applicable on site.

To replace the filter cartridge, unscrew the three screws in the cover and take them out. Remove the filter cartridge from the housing using the tool (pliers) supplied and insert the new filter cartridge. To finish, screw the covering back on.

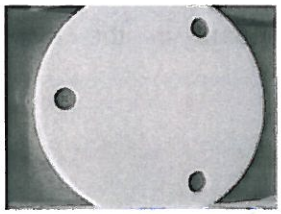


Fig. 5: Replacing filter: Take out the screws

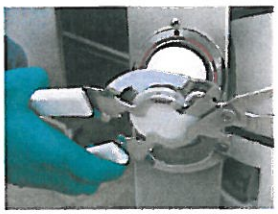


Fig. 6: Replacing filter: Removing the exhaust filter cartridge

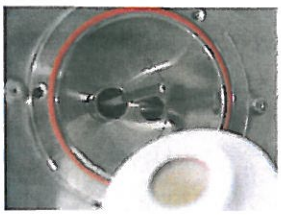


Fig. 7: Replacing filter: Inserting the new exhaust filter cartridge

7.6 Maintenance performed by technical customer service

In addition to all maintenance and care tasks carried out by the operator or user, it is imperative to have the autoclave maintenanced by a technical customer service agent at regular intervals. This not only increases the reliability of the product, but you can also then be sure that the appliance has been tested for safety in keeping with all applying norms and guidelines.

We recommend maintenance by a qualified person every 500 cycles, or at least once a year. The maintenance intervals can vary according to the type and frequency of use.

Please contact us and we will be glad to advise you on the type of maintenance appropriate for you, and also perform the maintenance work for you:

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Tel.: +49 (0)641 982120

Fax: +49 (0)641 982121

8 TROUBLESHOOTING

Aim of this section

This section gives you an overview of the error messages of the autoclave and the measures required to remove the errors.

Contents

8.1 Description and removal of errors

One of the following error messages appears in the display and the „ERROR“ LED lights up:

Removing error messages

All error messages must be removed by pressing the QUIT display key and entering the code for access level 1.

Troubleshooting	Possible cause	Removal of error Contact the Service department if necessary
Sensor Error The displayed chamber pressure is > 550 kPa or the displayed temperature is < 5 °C or > 155 °C	Temperature or pressure sensor is faulty	Replace faulty sensor
Low Vacuum The autoclave has not reached the preselected vacuum after 40 minutes	Leak in sterilization chamber Vacuum pump faulty No water supply to liquid ring vacuum pump	Check the sterilization chamber for leakages Check the vacuum pump fuse - see chapter 02 “Device description” Check water supply
Low Steam The autoclave has not reached the preset pressure within 40 minutes	Heating power too low Steam loss due to leakage	Check that the device is working Check the heating power Check the safety temperature limiter – see chapter 02 “Device description”
Low Chamb. Temp. The sterilization temperature has not been reached within the preset maximum warm-up time. The set sterilization temperature has been overstepped by more than 1.0 K during the sterilization phase; the cycle is interrupted.	Power failure Heating fault Sensor not placed correctly (in the item being sterilized) A cushion of air may have formed during the destruction of waste Incorrect sterilization cycle selected	Check that the device is working Position the sensor correctly Select an appropriate sterilization cycle Check the safety temperature limiter
High Chamb. Temp. A temperature > 145 °C has been measured in the pre-vacuum or heating up phase. The set sterilization temperature was exceeded by more than 3.5K in the sterilization phase, and the cycle is interrupted.	PT 100 sensor faulty Pressure controller faulty	Check the temperature sensor for damage and replace it if necessary

Troubleshooting	Possible cause	Removal of error Contact the Service department if necessary
Low Chamb. Press. The pressure correlating with the temperature was not reached in the sterilization phase and the cycle is interrupted	Pressure sensor faulty Insufficient steam supply	Check the safety temperature limiter
High Chamb. Press. The pressure correlating with the sterilization temperature was exceeded and the cycle is terminated	Pressure sensor faulty	Check the pressure sensor
High Gen.Press The pressure in the steam generator is greater than permitted.	Pressure sensor faulty The Heat Gen Prss F or Ster Gen Prss F parameter has been set to a value that is too high	Check the pressure sensor Check the setting of the Heat Gen Prs F or Ster Gen Prss F parameter
Manual Stop The Stop key was pressed, and the cycle is interrupted	User has interrupted cycle	Removing the message
Ring SW. Error (For pass-through autoclaves, on the device side) Ring2 SW. Error (Only for pass-through autoclaves, on the clean room side) Door not closed correctly, or error reported by door lock when door is open	The end switches for monitoring of the locking ring are not working The locking ring is not opening or closing completely The safety pressure switch is faulty The end switches are misaligned The locking ring does not open An end switch is jammed or misaligned	Check the end switch Check the safety pressure switch Check the compressed air supply for the pneumatics Check the end switch and the locking ring Before removing the error message, the appliance must be switched off and switched on again at the main switch
No Vac.Water Src. The vacuum pump is not taking in water	No water supply to vacuum pump	Check connections, turn on water tap Switch the appliance off and back on again via the main switch to remove the message Check the vacuum pump fuse - see chapter 02 "Device description"
No Demin.Water The feed pump of the steam generator is not circulating water. After a timer runs out, the upper water level electrode reports: "No demin. water".	No water supply to the feed pump of the steam generator The steam generator was empty and was therefore not filled within the preset time	Check connections, turn on water tap Switch the appliance off and back on again via the main switch to remove the message. Check the water feed pump fuse

TROUBLESHOOTING

Troubleshooting	Possible cause	Removal of error Contact the Service department if necessary
No Gen.Water The lower water level electrode reports that there is no water although the upper one reports that there is water	The lower water level electrode reports that there is no water	Check the connections of the lower and upper water level electrodes
No Chamb Water In autoclaves with spray cooling, the water level electrode in the sterilization chamber reports that there is no water during the cycle	Leak in sterilization chamber Insufficient water has been poured in	Check the drain valve and the connections to the sterilization chamber Pour in more water
Comp.Air Error	Compressed air is not available The cooling is stopped	Check the connection As soon as compressed air is available, the cooling is activated
Door Lock Error	Door mechanism is blocked Door mechanism is faulty	Remove error message: - Check whether door mechanism is being blocked by a foreign object - Check whether door seal is installed correctly
Door Unlock Error	Door mechanism is stiff Door seal is not installed correctly	- Remove error message - Ease the pressure on the door by pushing against it slightly (after approx. 20 seconds, the message Open should appear in the display) - Check whether door seal is installed correctly
Door Pull Error	Door remains locked during opening	- Check whether the door can be moved horizontally (approx. 1 cm) - Confirm error message - Move door back and forth, pressing Open at the same time

Tab. 1: Error messages

8.2 Messages

Message	Possible cause	Measure
Not ready	Door is not shut	Close the door, start the appliance, and follow any instructions in the display
	Steam generator has not yet built up the required steam pressure	
	Steam generator has no water	
	The pressure or temperature sensor displays an abnormal value	
	For appliances with exhaust filtration: the exhaust filter must be replaced	
	For appliances with spray cooling: there is no water in the sterilization chamber	
	Sterilization chamber or reservoir container not sufficiently full of demineralised water	
Repl. Filter	Recommended number of cycles has been reached	For filter replacement, see chapter 07, section "Replacing exhaust filter cartridge"
Drain condense ?	There is residual water in the chamber after the cycle	To drain condensate, see chapter 06, "Air exhaust filtration"
Tank empty	No demineralised water in the reservoir container	Fill with demineralised water

Tab. 2: Messages

8.3 Service address

We will help you resolve problems and provide support in all technical and usage questions.

9 DECOMMISSIONING AND DISPOSAL

9.1 Decommissioning

Consider the qualifications of the personnel!

The autoclave may only be decommissioned by trained personnel.

Create a pressure-free state!
- Fully complete the autoclaving process. If necessary, relieve the pressure container and tubes by opening the relief valve.

Before decommissioning it, empty the autoclave entirely.
- Take out the autoclaved items.
- Clean the collecting sieve in the steam exhaust.
- Remove any large accumulations of dirt.
- In the case of dangerous substances, clean the components. Observe relevant norms and guidelines!
- Drain water.
- If applicable, empty steam generator, tubes, valves and pumps.
- Empty reservoir container if necessary.

Disconnect the autoclave from the power supply!
- Turn off the main switch.
- Disable and secure the power supply.
- Pull out the mains plug.

Disconnect the autoclave from the supply and disposal connections!
- Disable the compressed air tube and detach it from the appliance.
- Disable the demineralised water connection and detach it from the appliance.
- Disable the cooling water connection and detach it from the appliance.
- Detach the waste water connection from the appliance.

Carry out dismantling:
- Pack the autoclave so it is fit for transportation.

9.2 Disposal

Consider the qualifications of the personnel!

The autoclave may only be decommissioned by trained personnel.

Observe legal conditions!

The disposal of the machine is to be carried out in accordance with the applicable laws and regulations.
If applicable, the decommissioning of the autoclave must be reported to the manufacturer and components must/can be sent back to the manufacturer.

Parts contaminated with dangerous substances must be marked as such before sending them.

If your device carries this symbol, you may not dispose of it with normal refuse at the end of its service life. In this case, ensure that your device and any accessories are disposed of properly at the end of the service life, in accordance with the national regulations.

9.3 Returning the appliance

When sending the appliance to headquarters for repair or recalibration, send it in the original packaging if possible, or in an appropriate transport container.

It is necessary to inform us first!

Always contact us before sending an appliance to us.
Please tell us the reason why you are sending it back and consult us about the necessary steps to be taken.

Information regarding the European dangerous materials regulation!

In accordance with EU guidelines, the owner of appliances that have come into contact with dangerous substances is responsible for the appropriate disposal or the correct declaration for transport of the appliance. At the same time, our company is responsible for protecting our employees against dangerous substances. For this reason, we inform you that:
- All appliances sent back to us must be free from any kind of dangerous substance (acids, alkalis, biogenic dangerous substances, etc.).
- The appliances must be purged and residual dangerous substances neutralised. Please note that with some appliances, there are cavities in the interior of the housing that are difficult to clean, and may contain remains of dangerous substances.
- On returning the appliance, the performance of the aforementioned measures must be confirmed in writing in the accompanying documents.

If the owner of the appliance cannot perform these measures, the costs arising from the removal of the dangerous substances during repair work are charged to the owner of the appliance.

10 TECHNICAL DATA

Aim of this section

This section gives you an overview of the technical data of autoclaves of the Systec DX/DE Series.

Contents

Diagrams

Tables

10.1 Specifications

10.1.1 Measures and weights – Systec DX/DE Series

MODEL	DX/DE -23	DX/DE -45	DX/DE -65	DX/DE -90	DX/DE -100	DX/DE -150	DX/DE -200
Chamber diameter [mm]	260	344	400	400	500	500	500
Depth (chamber) [mm]	400	500	500	700	500	500	1000
Chamber volume [l]	23	45	65	90	100	150	200
Chamber operating pressure [bar]	-1/+2,8	-1/+3	-1/+4	-1/+4	-1/+4	-1/+4	-1/+4
Chamber operating temperature [°C]	-10/140	-10/142	-10/150	-10/150	-10/150	-10/150	-10/150
External housing dimensions:							
Height [mm]	500	550	630	630	730	730	730
Width [mm]	555	618	750	750	850	850	850
Depth [mm]	650	740	770	970	810	1050	1300
Net weight [kg]	80	105	125	145	165	190	210
Only DX Series:							
Steam generator volume [l]	2	2	8	8	8	8	8
Steam generator operating pressure [bar]	+2,8	+3	+5	+5	+5	+5	+5
Steam generator operating temperature [°C]	140	140	160	160	160	160	160

Tab. 1: Measures and weights of the Systec DX/DE Series

10.1.2 Measures and weights – Systec DX Series 2D

MODEL	Systec DX-90 2D		Systec DX-150 2D		Systec DX-200 2D	
Chamber diameter [mm]	400		500		500	
Depth (chamber) [mm]	750		750		1000	
Chamber volume [l]	95		150		200	
Chamber operating pressure [bar]	-1/+4		-1/+4		-1/+4	
Chamber operating temperature [°C]	-10/150		-10/150		-10/150	
Steam generator volume [l]	8		8		8	
Steam generator operating pressure [bar]	+5		+5		+5	
Steam generator operating temperature [°C]	160		160		160	
External housing dimensions:	Clean room side	Device side	Clean room side	Device side	Clean room side	Device side
Height [mm]	780	1570	880	1670	880	1670
Width [mm]	920	1030	1020	1130	1020	1130
Depth [mm]	230	670	260	700	260	940
Net weight [kg]	230		255		350	

Tab. 2: Measures and weights of the Systec DX Series

10.1.3 Electrical data, setting values and materials

	DX -23, -45	DX -65, -90, -100 -150, -200, -90 2D, -150 2D, -200 2D
Number of heating elements	1	1
Heating performance [W]	2800	9000
Voltage [V]	220 – 240 V, 50 Hz	3 x 400, 50 Hz
Power consumption [Å]	10	15,5

Tab. 3: Electrical data for Systec DX Series

	DE-23	DE-45	DE -65, -90, -100	DE -150, -200
Number of heating elements	1	1	1	1
Heating performance [W]	2300	3000	4500	7250
Voltage [V]	220 – 240 V, 50 Hz	220 – 240 V, 50 Hz	3 x 400 V, 50 Hz	3 x 400 V 50 Hz
Power consumption [Å]	10	10	15,5	15,5

Tab. 4: Electrical data for Systec DE Series

Raw water contact pressure [bar]	2-10

Tab. 5: Water connection pressure for Systec DX/DE Series

Chamber material	ST. ST. 1.4571 (316 Ti)
Door material	ST. ST. 1.4571 (316 Ti)
Steam generator material (Only DX Series)	ST. ST. 1.4571 (316 Ti)
Housing material	ST. ST. 1.4301 (304)
Chamber and door insulation	Melamine resin foam
Steam generator insulation (Only DX Series)	Melamine resin foam

Tab. 6: Materials used in Systec DX/DE Series

10.2 Loading capacity of Systec DX/DE Series

Model	DX/DE -23	DX/DE -45	DX/DE -65	DX/DE -90	DX/DE -100	DX/DE -150	DX/DE -200
250 ml	11	24	23	31	2 x 30	2 x 42	2 x 59
500 ml	8	12	15	21	2 x 15	2 x 24	2 x 40
1000 ml	3	8	9	13	12	18	23
2000 ml	-	3	6	8	7	9	14
3000 ml	-	-	3	4	6	8	11
5000 ml	-	-	-	-	3	5	7

Tab. 7: Maximum loading capacity for Systec DX/DE Series when loading with Erlenmeyer flasks

Model	DX/DE -23	DX/DE -45	DX/DE -65	DX/DE -90	DX/DE -100	DX/DE -150	DX/DE -200
250 ml	18	24	31	40	2 x 36	2 x 54	2 x 83
500 ml	10	18	23	31	2 x 26	2 x 40	2 x 59
1,000 ml	4	10	15	18	18	26	40
2,000 ml	-	5	8	10	12	14	23
5,000 ml	-	-	3	4	6	8	11
10,000 ml	-	-	-	-	2	3	4

Tab. 8: Maximum loading capacity for Systec DX/DE Series when loading with media flasks (Schott)

Model	Wire-mesh baskets made of stainless steel		Stainless steel tubs for destruction sterilization	
	Dimensions (l x w x h) [mm]	Capacity	Dimensions (l x w x h) [mm]	Capacity
DX/DE-23	390 x 168 x132-	1	395 x 180 x 135	1
DX/DE-45	490 x 265 x 180	1	495 x 265 x 180	1
DX/DE-65	490 x 310 x 210	1	495 x 318 x 219	1
DX/DE-90	688 x 310 x 210	1	696 x 318 x 219	1
DX/DE-100	490 x 360 x 290 490 x 360 x 140	1 2	495 x 368 x 300	1
DX/DE-150	355 x 360 x 290 735 x 360 x 290 355 x 360 x 140 735 x 360 x 140	2 1 4 2	368 x 368 x 300 747 x 368 x 300	2 1
DX/DE-200	490 x 360 x 290 490 x 360 x 140	2 4	495 x 368 x 300	2

Tab. 9: Maximum loading capacity for Systec DX/DE Series when loading with wire-mesh baskets and tubs made of stainless steel

10.3 Loading capacity of Systec DX Series 2D

Model	DX-90 2D	DX-150 2D	DX-200 2D
250 ml	31	2 x 42	2 x 59
500 ml	21	2 x 24	2 x 40
1000 ml	13	18	23
2000 ml	8	9	14
3000 ml	4	8	11
5000 ml	-	5	7

Tab. 10: Maximum loading capacity for Systec DX Series 2D when loading with Erlenmeyer flasks

Model	DX-90 2D	DX-150 2D	DX-200 2D
250 ml	40	2 x 54	2 x 83
500 ml	31	2 x 40	2 x 59
1000 ml	18	26	40
2000 ml	10	14	23
5000 ml	4	8	11
10000 ml	-	3	4

Tab. 11: Maximum loading capacity for Systec DX Series 2D when loading with media flasks (Schott)

Model	Wire-mesh baskets made of stainless steel		Stainless steel tubs for destruction sterilization	
	Dimensions (l x w x h) [mm]	Capacity	Dimensions (l x w x h) [mm]	Capacity
DX-90 2D	688 x 310 x 210	1	700 x 300 x 150	1
DX-150 2D	355 x 360 x 290 735 x 360 x 290 355 x 360 x 140 735 x 360 x 140	2 1 4 2	355 x 375 x 200 715 x 375 x 200	2 1
DX-200 2D	500 x 380 x 250 500 x 380 x 135	2 4	500 x 375 x 200	2

Tab. 12: Maximum loading capacity for Systec DX Series 2D when loading with wire-mesh baskets and tubs made of stainless steel

10.4 Dimensional drawings

10.4.1 Systec DX/DE-23

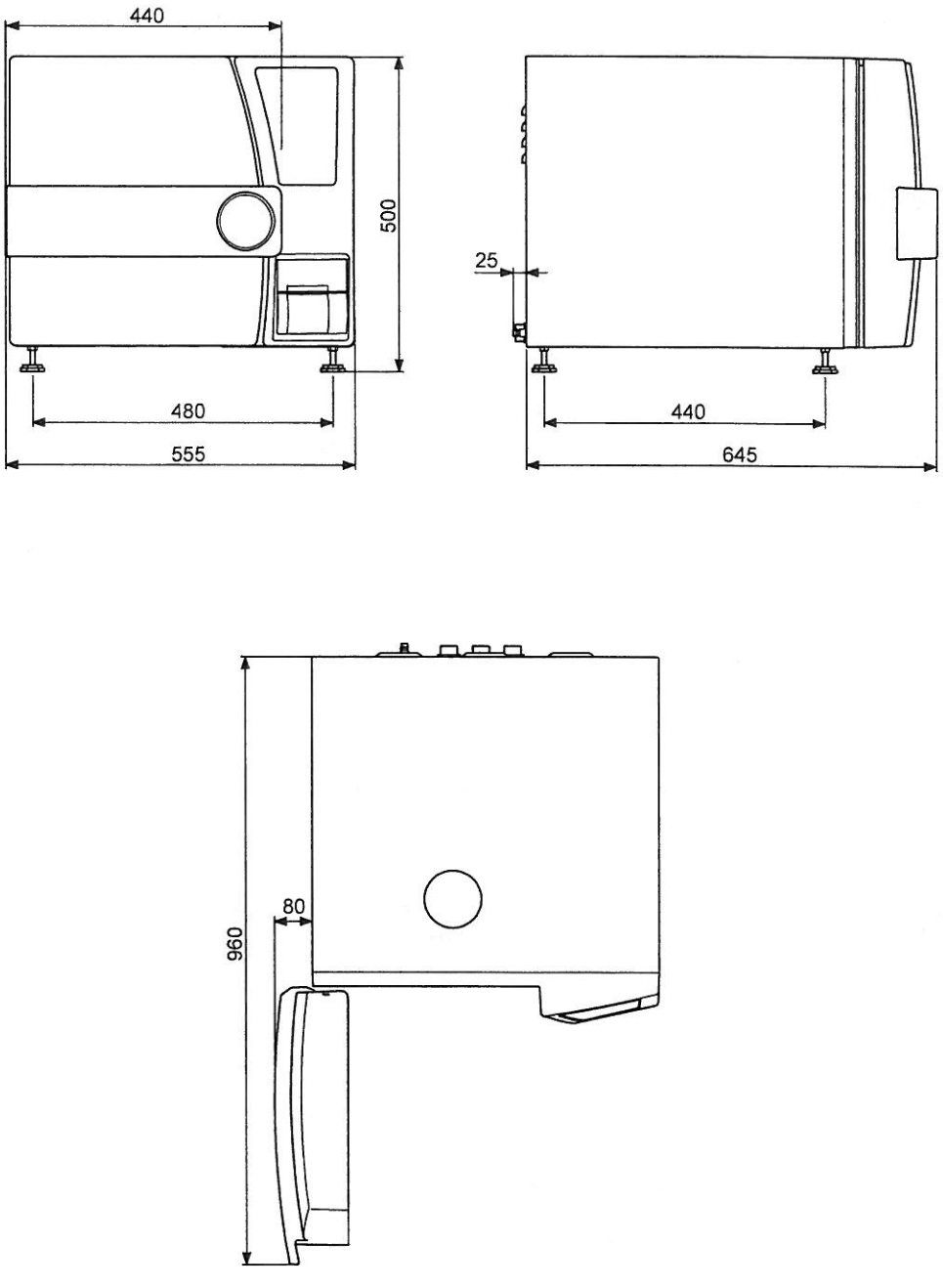

Fig. 1: Outer dimensions of Systec DX/DE-23

10.4.2 Systec DX/DE-45

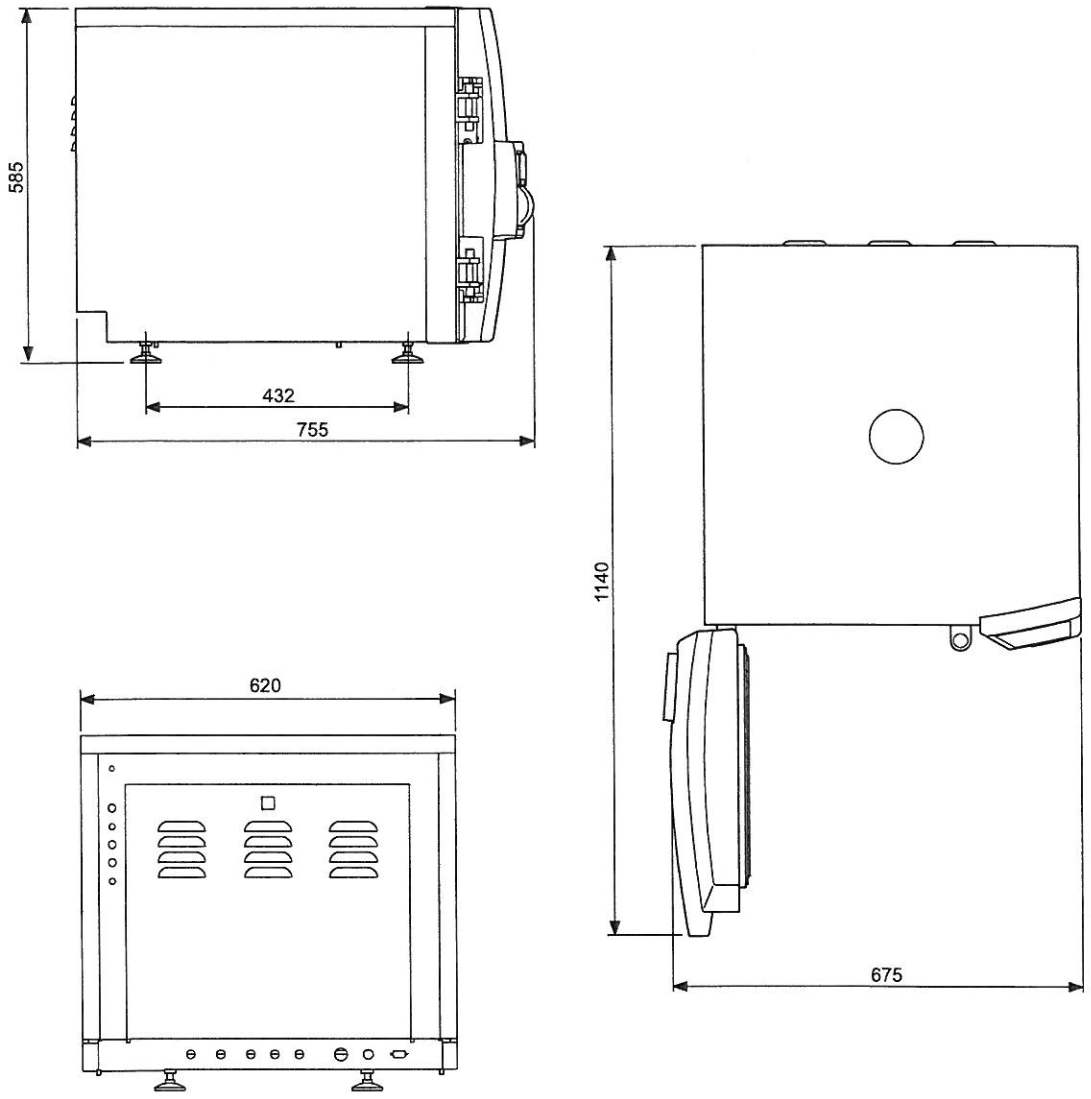

Fig. 2: Outer dimensions of Systec DX/DE-45

10.4.3 Systec DX/DE-65

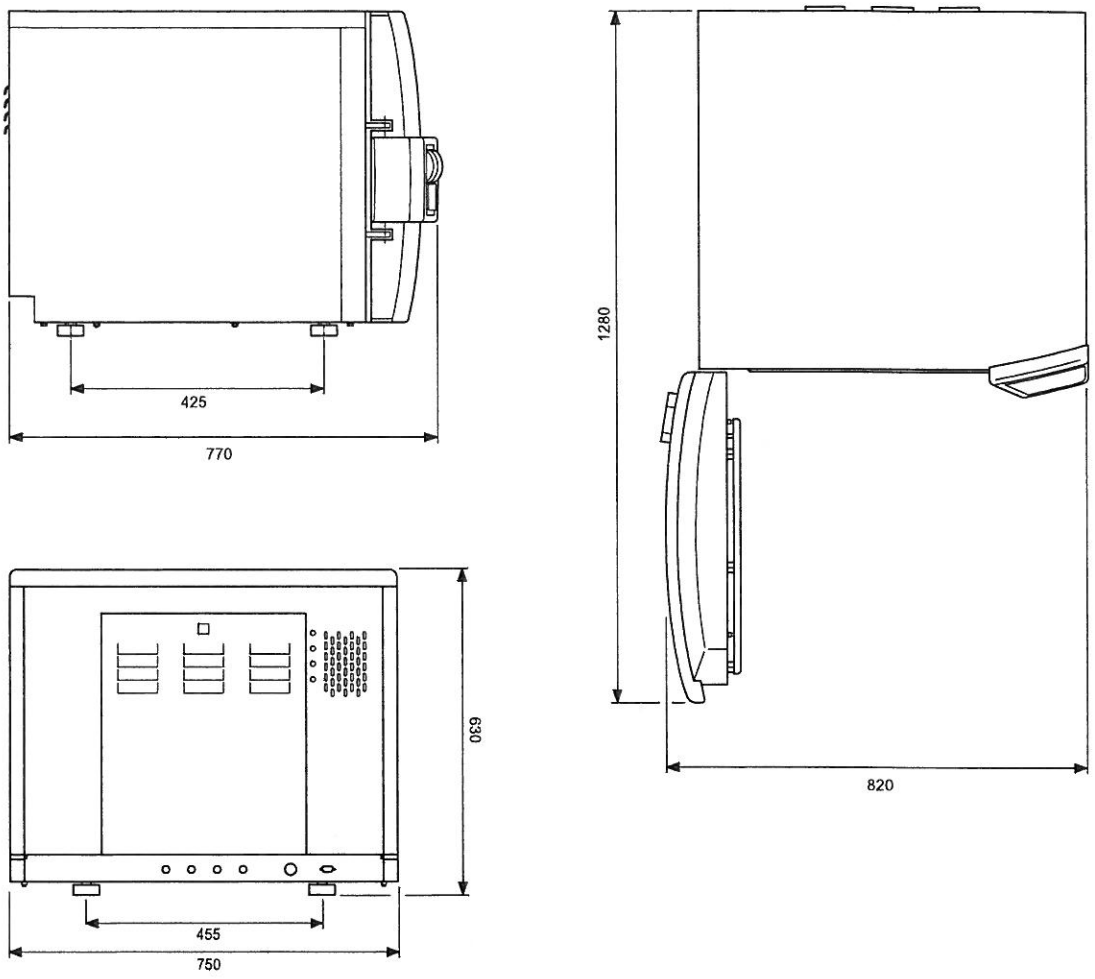

Fig. 3: Outer dimensions of Systec DX/DE-65

10.4.4 Systec DX/DE-90

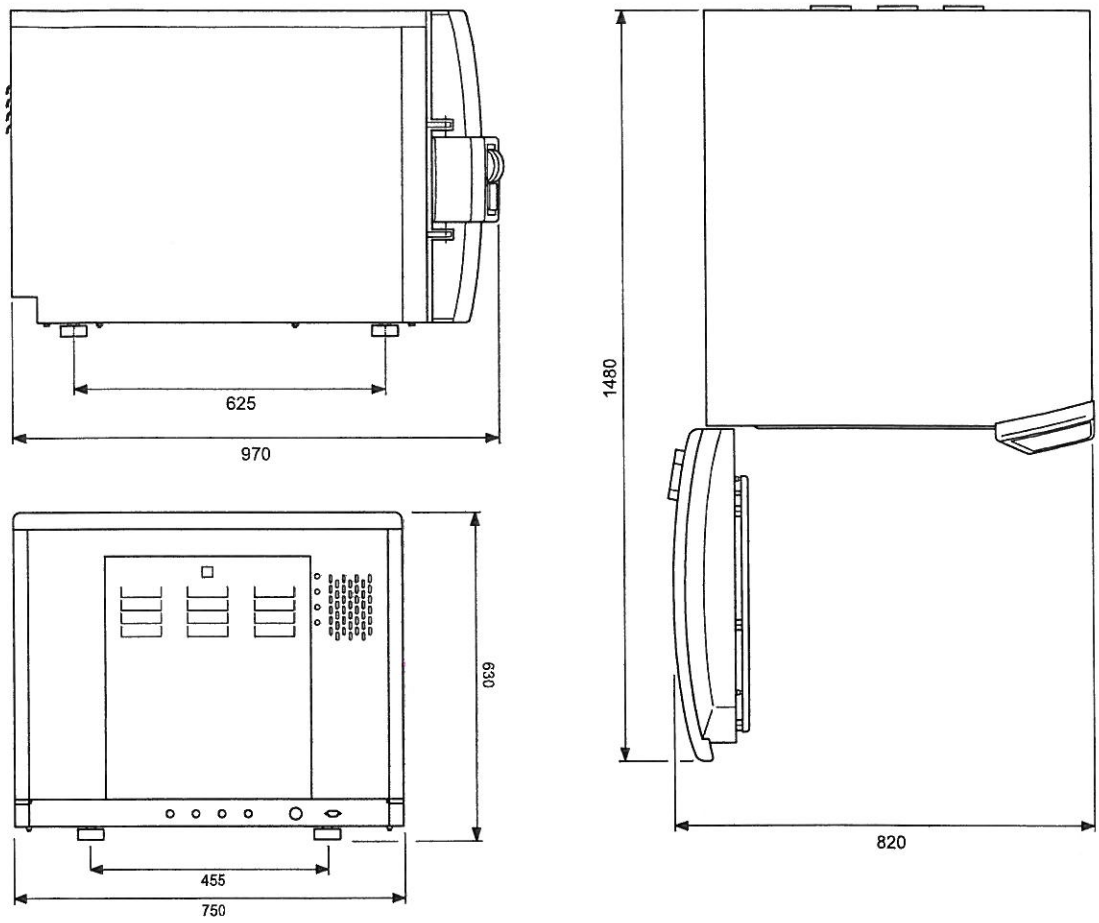

Fig. 4: Outer dimensions of Systec DX/DE-90

10.4.5 Systec DX/DE-100

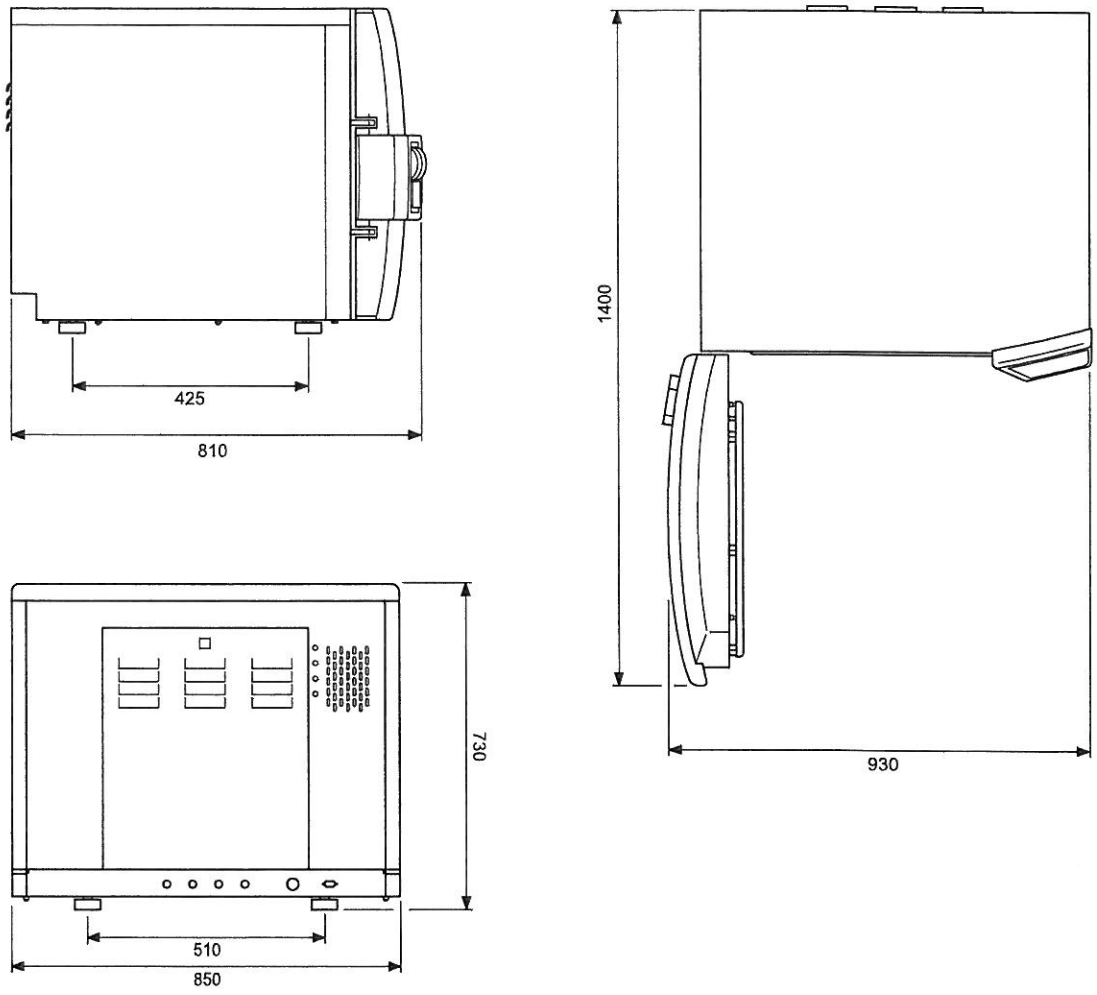

Fig. 5: Outer dimensions of Systec DX/DE-100

10.4.6 Systec DX/DE-150

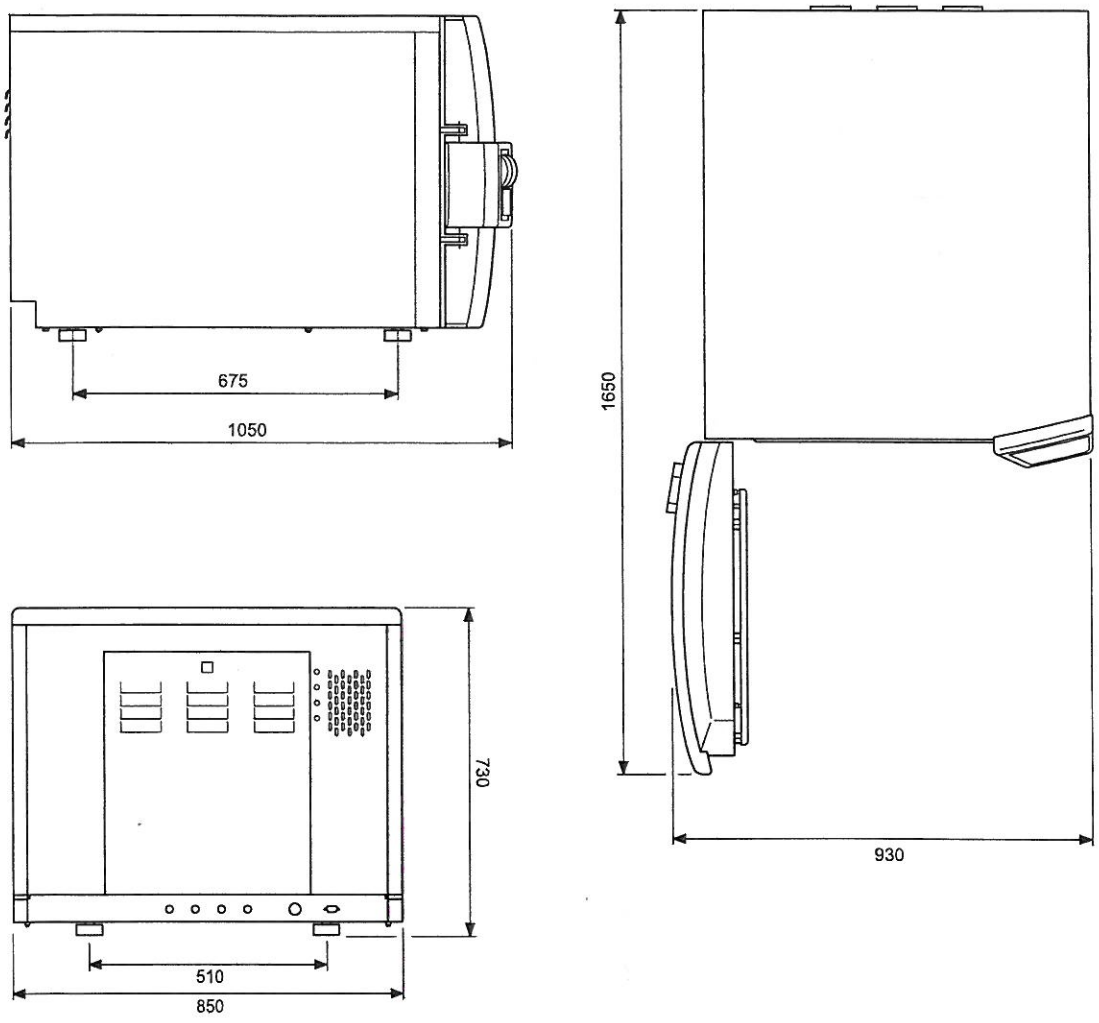

Fig. 6: Outer dimensions of Systec DX/DE-150

10.4.7 Systec DX/DE-200

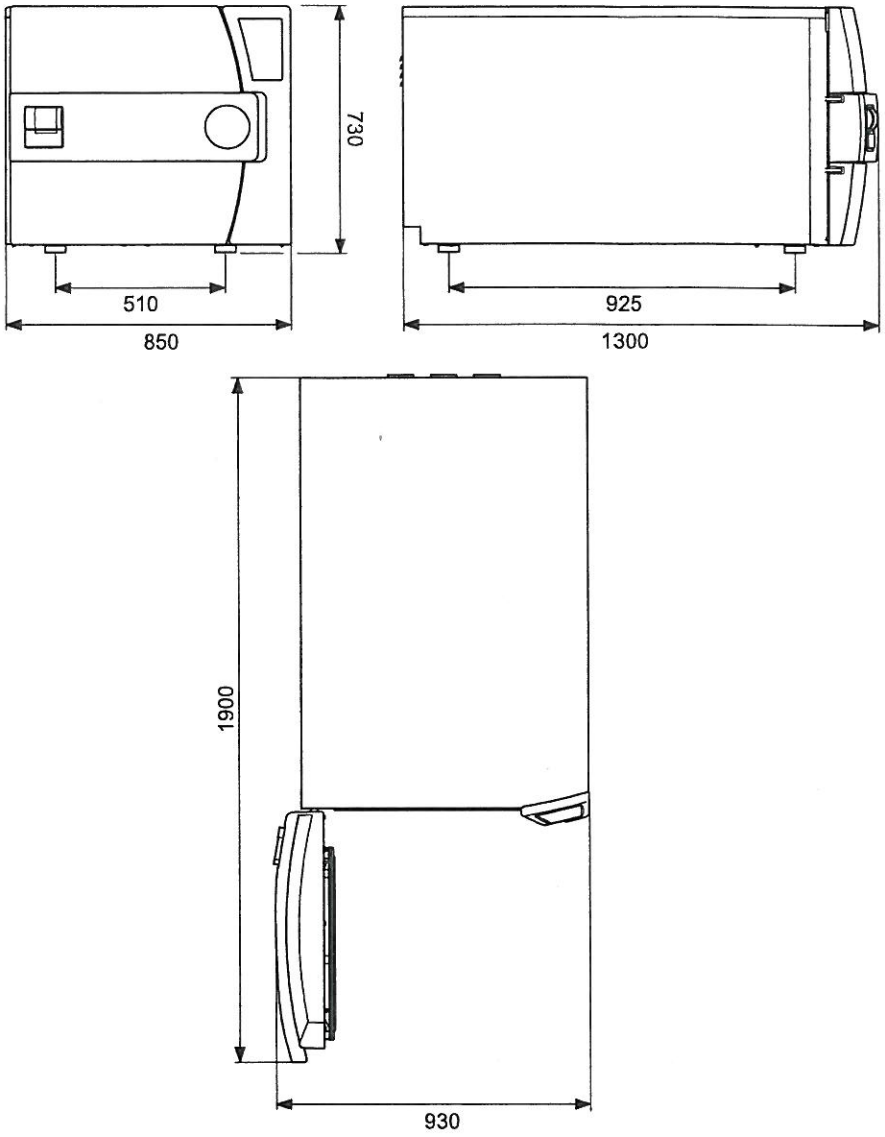

Fig. 7: Outer dimensions of Systec DX/DE-200

10.4.8 Systec DX-90 2D

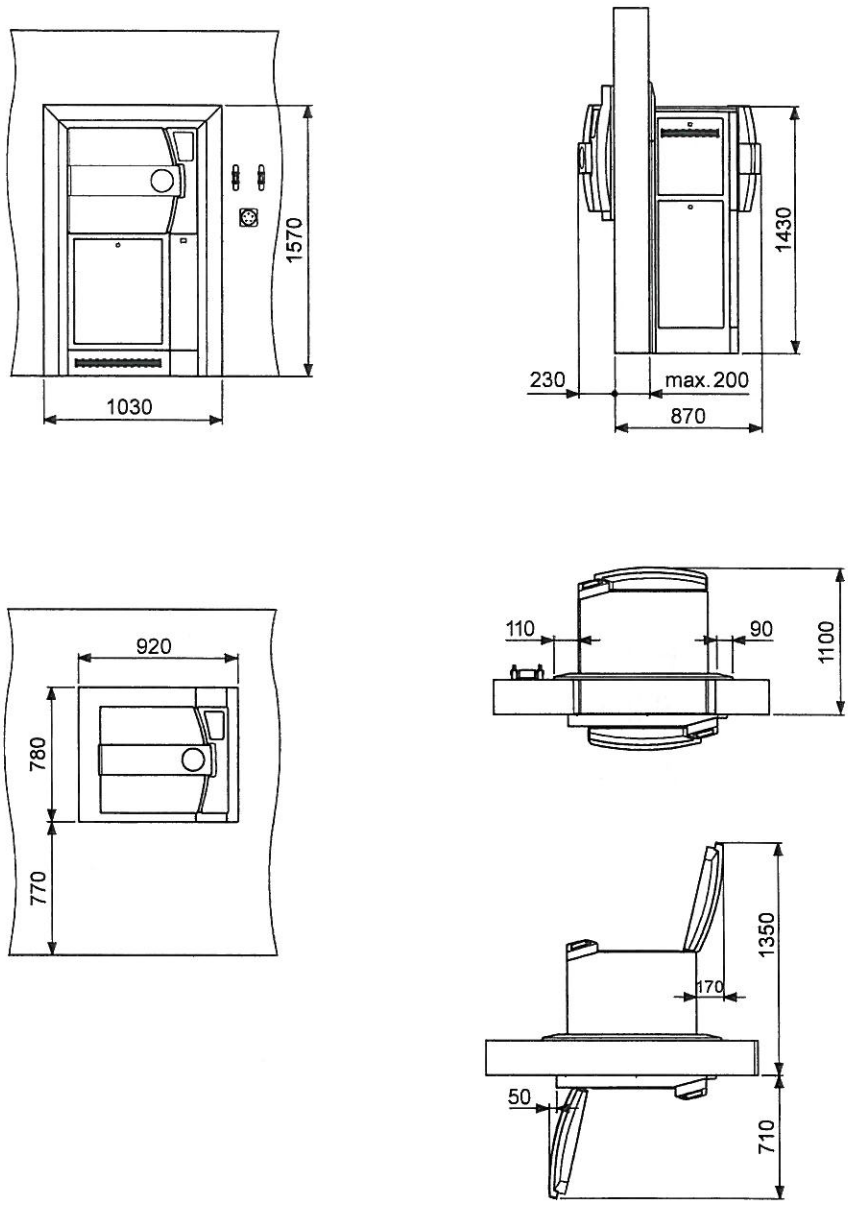

Fig. 8: Outer dimensions of Systec DX-90 2D

10.4.9 Systec DX-150 2D

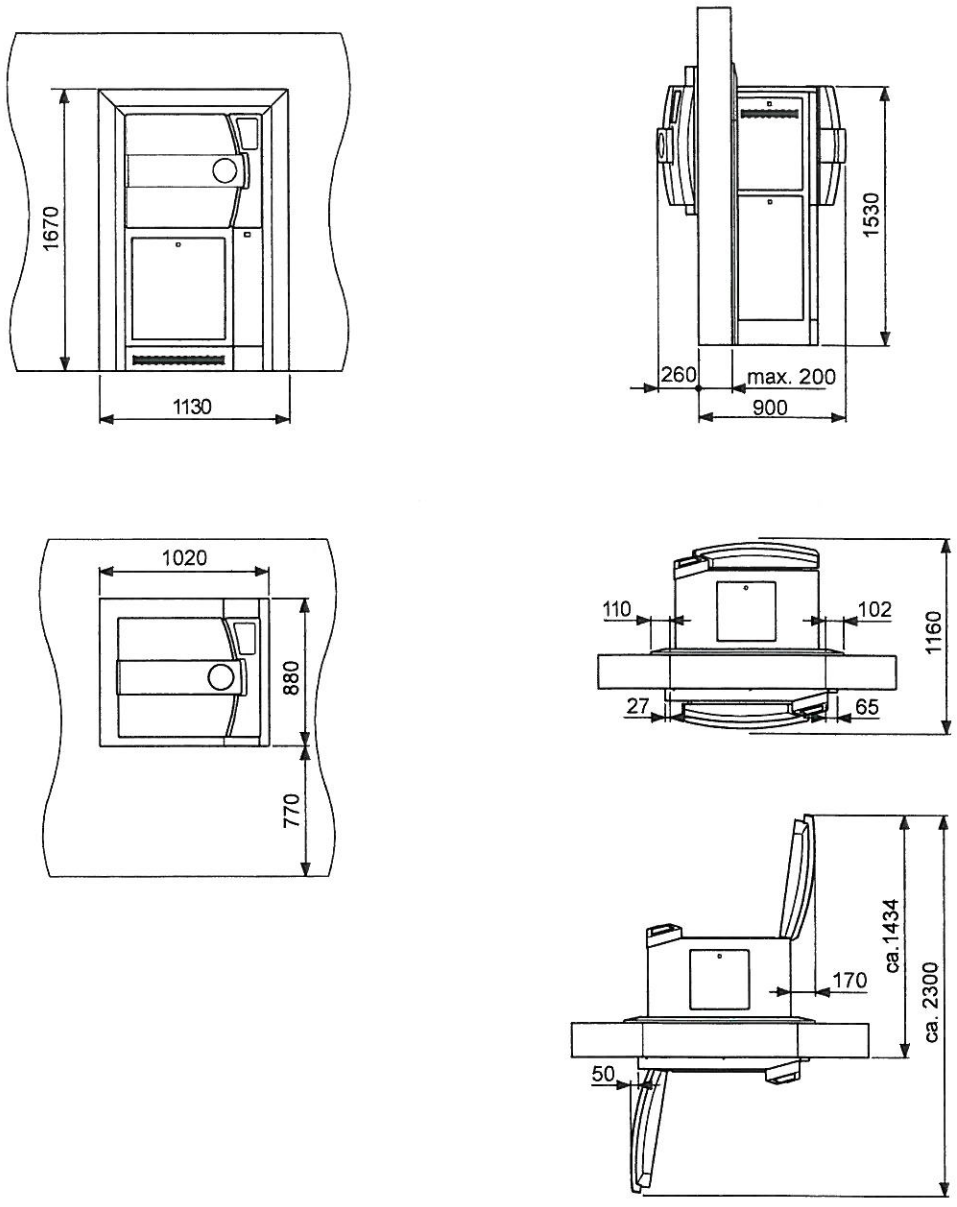

Fig. 9: Outer dimensions of Systec DX-150 2D

10.4.10 Systec DX-200 2D

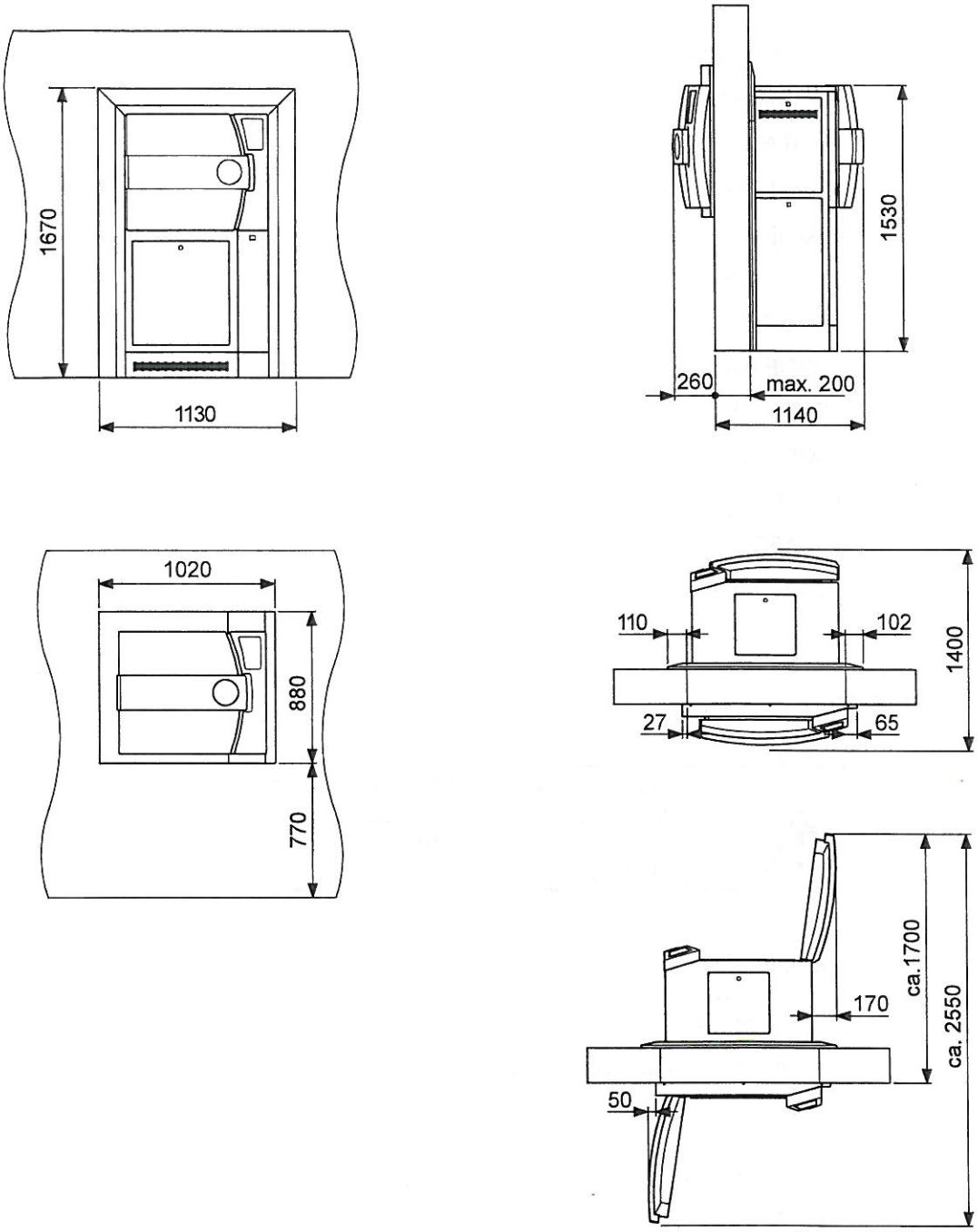

Fig. 10: Outer dimensions of Systec DX-200 2D

10.5 Noise and heat emission

Noise level [dbA]	
All models	< 70
Heat emission [W/h]	
DX/DE-23	< 400
DX/DE-45	< 400
DX/DE-65	< 600
DX/DE-90	< 700
DX/DE-100	< 700
DX/DE-150	< 800
DX/DE-200	< 900
DX-90-2D	< 700
DX-150-2D	< 800
DX-200-2D	< 900

Tab. 13: Sound and heat emission for Systec DX/DE Series

10.6 Water quality

Ensure the limits for water quality are maintained!

The quality of the demineralised water and the unprocessed water used has considerable influence on the performance and useful life of the autoclave.

Demineralised water serves as the chamber feed water. Raw water of drinking water quality is used for cooling and for an optimal vacuum arrangement.

The following limit values must be adhered to in accordance with DIN 58951-2:

Chamber feed water conductivity (at 20 °C)	< 15 µS/cm and ∑ alkaline earth ions < 0.02 mmol/l
Raw water quality	∑ alkaline earth ions ≤ 2.0 mmol/l, corresponding to a total hardness of 11° German hardness

Tab. 14: Quality requirements of the water to be used with the Systec DX/DE Series

11 APPLIANCE LOG BOOK

Systec GmbH

Laboratory Systems Technology

5111 Pegasus Court, Suite H
Frederick, MD 21704
800EZMICRO.com

(p) 800-396-4276
(p) 301-662-6835
(f) 301-662-8096

Place of manufacture (stamp)

Appliance:	Autoclave		
Model:	Systec		
Serial number:			
Date of manufacture:			
Location:			
Date of commissioning:			
Commissioned by:		**Signature:**	
Operator's signature:			

Special feature of pass-through autoclaves

Door mode set for 2 D appliances, see chapter 04, section "Special features of pass-through autoclaves"	**1**	**2**	**3**	**4**
Operator's agreement to Door mode set				
Operator's signature:				

Date	Employee instructed in usage	Signature

Service provider

The appliance log book
contains 3 service pages.

APPLIANCE LOG BOOK

The appliance log book is to be kept for at least five years after the appliance is decommissioned.

Date	Work carried out / parts replaced	Signature

Date	Work carried out / parts replaced	Signature

APPLIANCE LOG BOOK

Date	Work carried out / parts replaced	Signature

12 DIAGRAMS, DRAWINGS, CERTIFICATES

Aim of this section

In this section you will find all graphs, diagrams and certificates for the autoclaves of the Systec DX/DE Series.

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