Laboklav

SHP Steriltechnik AG

Dampfsterilisatoren
Steam sterilizers

Type 55 - 195 Liter

User manual

edition 08/2023 – V6

SHP Steriltechnik AG

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Please read these user instructions before starting the use of the steam sterilizer! It is necessary to keep this user manual over the complete life cycle of the sterilizer nearby the unit.

Indications included in this manual and labeled **warning**, **important** and **attention** are very important and to pay attention to them. They are marked with the following graphical symbols.

Warning

	**Failing to observe these warnings can cause injury and even death. This symbol also means that an operator must acquaint with a suitable passage in the manual.**

Important

	**This symbol denotes important indications for example to prevent sterilizer or load damage.**

Attention

	**Observing the texts marked with this symbol facilitates operation of the sterilizer.**

General Warnings:

	**Access to sterilizer operations manual should be restricted only to persons authorized to operate a sterilizer**

	**During an installation of a sterilizer, after maintenance performed by technical staff and during power outlet exchange, the verification of null electric potential of the elements being touched by users should absolutely be performed by authorized staff.**

General safety instructions:

Observe the following safety instructions for the operation of the autoclave!

Determination

- Only use the autoclave for the purpose defined in the operating instructions.

Power cord and power plug

- Never damage or change the power cord or power plug.
- Never operate the autoclave if the power cord or plug is damaged.
- Never pull on the power cord to remove the power plug from the outlet. Always touch the power plug directly.

Installation

- Follow the instructions in this manual to install and operate the unit. We recommend that the first commissioning is carried out by authorised specialist personnel of SHP Services GmbH.
- Do not operate the autoclave in potentially explosive atmospheres.
- Only have the electrical connection set up by a specialist.

Program termination

- Note, that hot water and steam can leave the chamber when the door is opened immediately after a program has been stopped manually.
- Depending on the time of program termination, the load may be not sterile. Observe the instructions on the display of the autoclave. You may need to sterilize the item again.
- Never open the door with force.

Removal of sterile goods

- Use gloves to remove the trays or bottom plate and wait until everything has cooled down. Never touch the sterile goods with unprotected hands. The parts can be hot.
- Check the packaging of the items to be sterilized for removal from the autoclave.

Maintenance

- Have the service carried out by authorized persons only.

Malfunctions

- If you get repeated error messages when operating the autoclave, put the autoclave out of service and, if necessary, inform your specialist or authorized service.
- Have the autoclave repaired only by authorized persons.

Content

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1. General application, construction and use of steam sterilizer line Laboklav 55-195

The steam sterilizer line **Laboklav 55 - 195** is equipped with a chamber by 55 to 195 Liter chamber volume. It is constructed for the steam sterilization of instruments, materials for **non-medical use** and liquids (based on water or an equivalent aqueous property). All versions contain a norm conform thermo lock. Different versions depending on the use of the sterilizers are available.

In the **basic version** (Laboklav xxx B) sterilization of all the above mentioned sterilization items is possible, the cycles are configured as general use cycles. Unpackaged instruments and materials as well as liquids can be sterilized as long as they are approved for the applied temperature range. Do not sterilize hollow bodies (e.g. tubes) and porous materials (e.g. textiles). For such materials, these cycles cannot be validated in the basic version and the sterilization result is therefore undefined.
(Version with vacuum option is necessary here!)

The **version with fast liquid cooling option** (Laboklav xxx M) is equipped to make the cooling process of liquids faster than self-cooling process can be. The use of the active cooling process is constructed for the use of not tightly closed flasks! Reduce of process time of cooling process is about 40 % compared with basic version! In consequence of the active cooling process happens a loss of liquids by 3 – 12 % depending of the pressure reduce speed (programmable by service).

☞	**Attention! This is always associated with an increased loss of liquid in the sterilization material.**

Further versions (Laboklav xxx MS and MSL) are equipped to reduce the loss of liquids and to allow with MSL the sterilization of tightly closed flasks.

The **vacuum version** (Laboklav xxx yyy V) includes a water ring vacuum pump. This makes the steam sterilization process safe for wrapped, porous and hollow materials. Additionally this version includes the possibility of drying the materials.
The standard programs for the sterilization of liquids (as available in the basic unit) are also available here.

⚠	**The water ring pump in units with vacuum option should run minimum once per week. This prolongers the life cycle of the vacuum pump and protects the pump against malfunctions.**

The different options are possible to combine in one unit (Laboklav xxx MV, MSV, MSLV).

For the **use of the sterilizer in safety laboratories** a special steam exhaust filtration is available to protect the environment against elusion of non-sterilized microorganism.

⚠	**The manufacturer is not liable or responsible for defects or indefinitely results if the sterilizer is not under intended use.**

The steam sterilizer line Laboklav 55 – 195 allows a fully automatic process cycle. That includes deaeration, heating, sterilization, pressure remove and cooling or drying function (optional if included in the actual version). All steps for an automatic process are controlled by a microprocessor control board. The actual status is shown on a graphic display and includes all important information for the user to operate the device. The supported temperature range of the sterilization process is 103°C to 136°C. The typical temperatures of 121°C and 134°C are programmed for different sterilizing situations and different materials. All program positions can be reprogrammed by special trained engineers / service staff.

The steam sterilizer line Laboklav 55 – 195 includes the following additional advantages:

- Automatic preheating to reach defined condition in the start situation is in each program separately to define. This function is especially developed for fractionated pre-vacuum process to reduce the condensate in the chamber and on the sterilization goods.
- Fully automatic deaeration of the sterilization goods by fractionated pre-vacuum (in vacuum option only) or pressure purge process for solids and gravity process for liquid goods.
- Use of the principle of hot stone for the steam production reduces the use of water and decreases the heating time of the device. That makes the process much more economic than the typical steam generation process in a classic steam generator.
- Cooling process using the feed water stored in an included feed water tank (in all units with included fast cooling option). That reduces the need of expensive demineralized water and saves heating energy in the feed water. Additionally it is degassing the feed water for the next cycle so it increases the quality of the complete sterilization process.
- Protection of the drain on house installation side by using normal tape water mixing to the steam outlet. That process works temperature controlled by a PT100 in the outlet installation. The temperature is programmable for opening and closing the mixing valve.
- Automatic cleaning function for the steam generator in running in each cycle. It protects the unit against heater damage forced by bad water quality.
- Microprocessor controlled process for fully automatic use.

Total view of the steam sterilizer Laboklav xxx

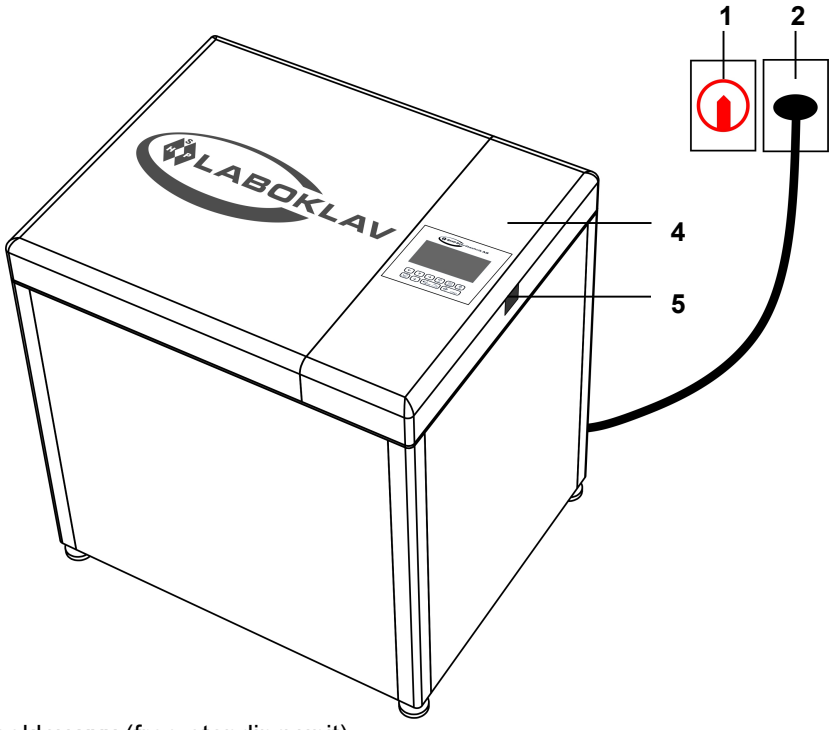


Figure: Total view of Laboklav xxx (free-standing unit)

The Laboklav should be operated while the normal laboratory working hours. If the device is not in use, it should be switched off by the main power plug (5). Overnight and on the weekends the central power plug (1) should be switched off. If that central power plug is missing, please use the main breaker below the housing (4) on the right side of the unit.

Emergency Switch off

Switch off the device by turning the central main power switch (1) or disconnect the sterilizer from power supply by using the power plug (2).

2. Steam sterilizer Laboklav 55 - 195 technical data

Laboklav 55

Overall dimension (free standing unit) (W x H x D)…….	740 x 765 x 600 mm
Footprint (Bench top unit) (W x D).....	740 x 670 mm
Weight (netto).....	about 125 kg
Volume Feed Water tank.....	about 16 l
Maximum Load:	
- Instruments…….....	20 kg
- Textiles…….....	10 kg
- Liquids.....……..	15 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 62 l
Chamber dimension (ϕ x D).....	ϕ 410 x 460 (+50-round.) mm
Usable Volume.....…	ca. 60 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…….....	1.4404 (SS 316 L)
Surface roughness …….....….	≤ 0,8 µm
Pressure Device Directive 2014/68/EU.....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord……..…….....	CEE-plug 16 A
Working power.....	6,5 kW
Averaged power consumption per cycle.....	6,5 kWh
Protection class .....……	**I**
Protection….....……..…….....	IP24
Electromagnetic compatibility .....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 3,5 l - 8 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Laboklav 80

Overall dimension (free standing unit) (W x H x D)……..	740 x 915 x 600 mm
Footprint (Bench top unit) (W x D).....	740 x 820 mm
Weight (netto).....	about 165 kg
Volume Feed Water tank.....	about 30 l
Maximum Load:	
- Instruments…….....	30 kg
- Textiles……	10 kg
- Liquids…….....…….	21 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 82 l
Chamber dimension (ϕ x D).....	ϕ 410 x 610 (+50-round.) mm
Usable Volume.....…	ca. 80 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…….....	1.4404 (SS 316 L)
Surface roughness…….....….	≤ 0,8 µm
Pressure Device Directive 2014/68/EU.....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord……..…….....….	CEE-plug 16 A
Working power	6,5 kW
Averaged power consumption per cycle.....	6,5 kWh
Protection class.....…….....	**I**
Protection….....……..…….....	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 3,5 l - 10 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity….....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Laboklav 100

Overall dimension (free standing unit) (W x H x D)…….	740 x 1065 x 600 mm
Footprint (Bench top unit) (W x D).....	740 x 970 mm
Weight (netto).....	about 195 kg
Volume Feed Water tank.....	about 30 l
Maximum Load:	
- Instruments.....	40 kg
- Textiles…….....	25 kg
- Liquids.....…….	30 Liter Total volume
Sterilizer chamber:	
Total volume	about 102 l
Chamber dimension (ϕ x D).....	ϕ 410 x 760 (+50-round.) mm
Usable Volume.....…	ca. 100 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…....	1.4404 (SS 316 L)
Surface roughness…….....…	≤ 0,8 µm
Pressure Device Directive 2014/68/EU.....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord……..….....	CEE-plug 16 A
Working power.....	6,5 kW
Averaged power consumption per cycle.....	6,5 kWh
Protection class.....……..	**I**
Protection….....……..……...	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 4,5 l - 12 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Laboklav 135

Overall dimension (free standing unit) (W x H x D)……	840 x 965 x 700 mm
Footprint (Bench top unit) (W x D).....	840 x 870 mm
Weight (netto).....	about 205 kg
Volume Feed Water tank.....	about 40 l
Maximum Load:	
- Instruments…….....	40 kg
- Textiles…….....	25 kg
- Liquids.....…….	30 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 135 l
Chamber dimension (ϕ x D).....	ϕ 500 x 660 (+50-round.) mm
Usable Volume.....…	ca. 130 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…....	1.4404 (SS 316 L)
Surface roughness…….....…	≤ 0,8 µm
Pressure Device Directive 2014/68/EU…….....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord…….....	CEE-plug 16 A
Working power	10 kW
Averaged power consumption per cycle.....	15 kWh
Protection class .....……..	**I**
Protection….....……..…….....	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle….....	about 5,5 l - 15 l
(depending on initial state, program and load)	
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Laboklav 160

Overall dimension (free standing unit) (W x H x D)…….....	840 x 1065 x 700 mm
Footprint (Bench top unit) (W x D).....	840 x 975 mm
Weight (netto).....	about 220 kg
Volume Feed Water tank.....	about 40 l
Maximum Load:	
- Instruments…….....	40 kg
- Textiles…….....	25 kg
- Liquids…….....…….	45 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 165 l
Chamber dimension (ϕ x D).....	ϕ 500 x 760 (+50-round.) mm
Usable Volume.....…	ca. 163 l
Maximum allowable pressure (PS)…….....	2.8 bar
Maximum allowable temperature (TS)….....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…..	1.4404 (SS 316 L)
Surface roughness…….....…….....…	≤ 0,8 µm
Pressure Device Directive 2014/68/EU…….....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord……..…….....	CEE-plug 16 A
Working power….....	10 kW
Averaged power consumption per cycle….....	17 kWh
Protection class…..……..	**I**
Protection…..……..……...	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 5,5 l - 17 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Laboklav 195

Overall dimension (free standing unit) (W x H x D)…….....	840 x 1215 x 700 mm
Footprint (Bench top unit) (W x D).....	840 x 1085 mm
Weight (netto).....	about 255 kg
Volume Feed Water tank.....	about 40 l
Maximum Load:	
- Instruments…….....	40 kg
- Textiles…….....	25 kg
- Liquids…….....……..	45 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 195 l
Chamber dimension (ϕ x D).....	ϕ 500 x 990 (+50-round.) mm
Usable Volume.....….	ca. 182 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…....	1.4404 (SS 316 L)
Surface roughness…….....…	≤ 0,8 µm
Pressure Device Directive 2014/68/EU…….....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	3N 400V~ (±5%), 50 Hz, 16A
Power cord……..…….....	CEE-plug 16 A
Working power.....	10 kW
Averaged power consumption per cycle….....	18 kWh
Protection class….....…….....	**I**
Protection….....……..……...	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 8,5 l - 18 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

2.1. Optional Laboklav 55 and Laboklav 80 with 230V

Optional Laboklav 55

Overall dimension (free standing unit) (W x H x D)……..	740 x 765 x 600 mm
Footprint (Bench top unit) (W x D).....	740 x 670 mm
Weight (netto).....	about 125 kg
Volume Feed Water tank.....	about 16 l
Maximum Load:	
- Instruments…….....	20 kg
- Textiles…….....	10 kg
- Liquids.....……..	15 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 62 l
Chamber dimension (ϕ x D).....	ϕ 410 x 460 (+50-round.) mm
Usable Volume.....…	ca. 60 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…….....	1.4404 (SS 316 L)
Surface roughness …….....	≤ 0,8 µm
Pressure Device Directive 2014/68/EU.....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	230V~ (±10%), 50 Hz
Power cord……..…….....	plug 16 A
Working power.....	3,5 kW
Averaged power consumption per cycle.....	3,5 kWh
Protection class	**I**
Protection….....……..…….....	IP24
Electromagnetic compatibility	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle.....	about 3,5 l - 8 l
(depending on initial state, program and load)	
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity.....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

Computer interface:

- serial interface RS 485

Optional with printer or touchdisplay

Optional Laboklav 80

Overall dimension (free standing unit) (W x H x D)……..	740 x 915 x 600 mm
Footprint (Bench top unit) (W x D).....	740 x 820 mm
Weight (netto).....	about 165 kg
Volume Feed Water tank.....	about 30 l
Maximum Load:	
- Instruments…….....	30 kg
- Textiles……	10 kg
- Liquids…….....…….	21 Liter Total volume
Sterilizer chamber:	
Total volume.....	about 82 l
Chamber dimension (ϕ x D).....	ϕ 410 x 610 (+50-round.) mm
Usable Volume.....…	ca. 80 l
Maximum allowable pressure (PS).....	2.8 bar
Maximum allowable temperature (TS).....	138°C
Working pressure safety valve.....	2.8 bar
Material of chamber and double jacket.....…….....	1.4404 (SS 316 L)
Surface roughness…….....….	≤ 0,8 µm
Pressure Device Directive 2014/68/EU.....	CE0036, Kat. II, Modul B+C2
Power supply:	
Voltage.....	230V~ (±10%), 50 Hz
Power cord……..…….....….	plug 16 A
Working power	3,5 kW
Averaged power consumption per cycle.....	3,5 kWh
Protection class.....…….....……..	**I**
Protection….....……..…….....	IP24
Electromagnetic compatibility.....……..……	DIN EN 61326
Water supply:	
Destilled or demineralized Water	
(acc. to annex C EN 13060)	
Averaged feed water consumption per cycle..... (depending on initial state, program and load)	about 3,5 l - 10 l
Storing conditions:	
Temperature.....	5 ÷ 40°C
Humidity….....	max. 85%
Heat emission to the environment.....	ca. 12% of rated capacity

Programs:

10 predefined programs in user level 1:

The program definition depends on the available options included in the model. The programs can be individually changed.

10 further programs in user level 2 (program P11 - P20) code protected, Predefinition is like P1.

2 test programs (Bowie & Dick-Test, P11, vacuum test, P12) - in vacuum versions only

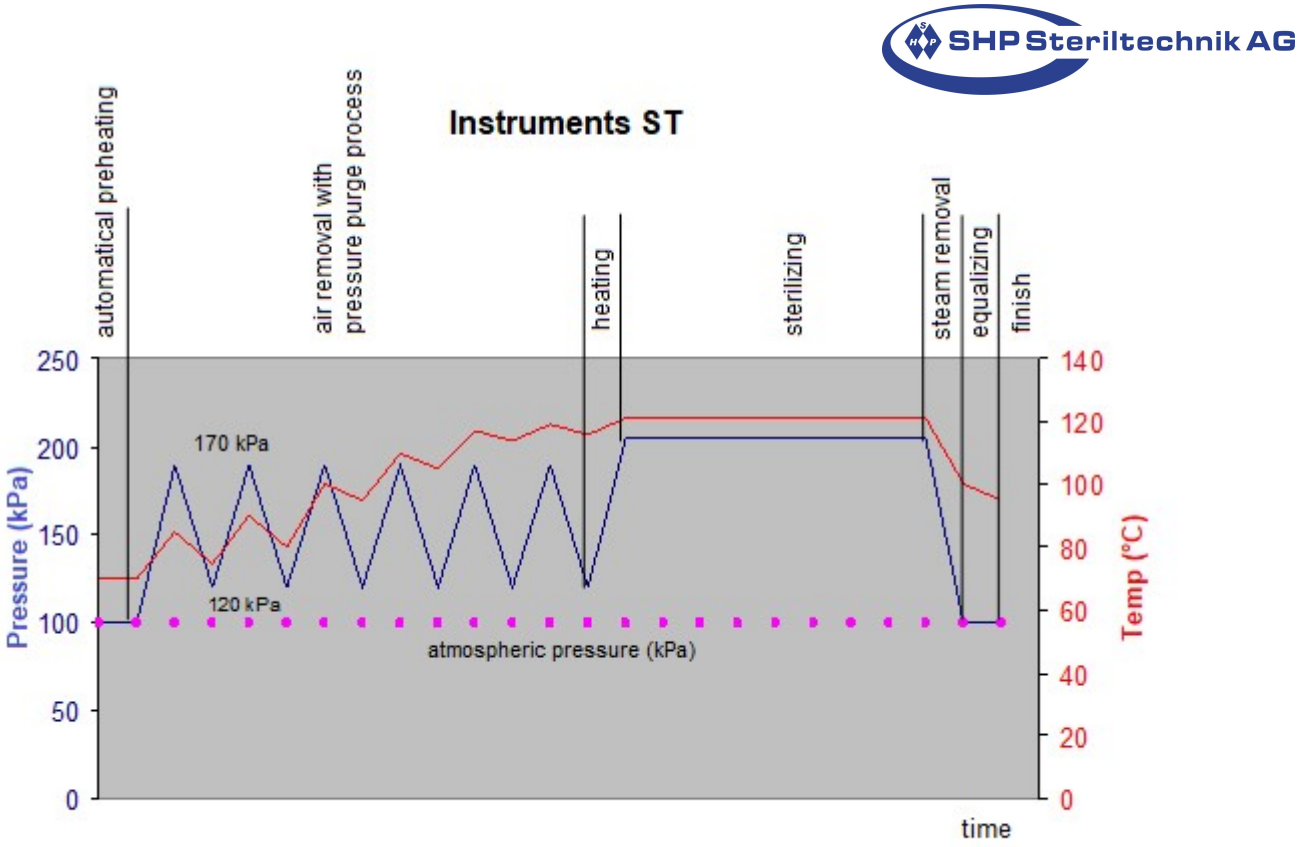
Computer interface:

- serial interface RS 485

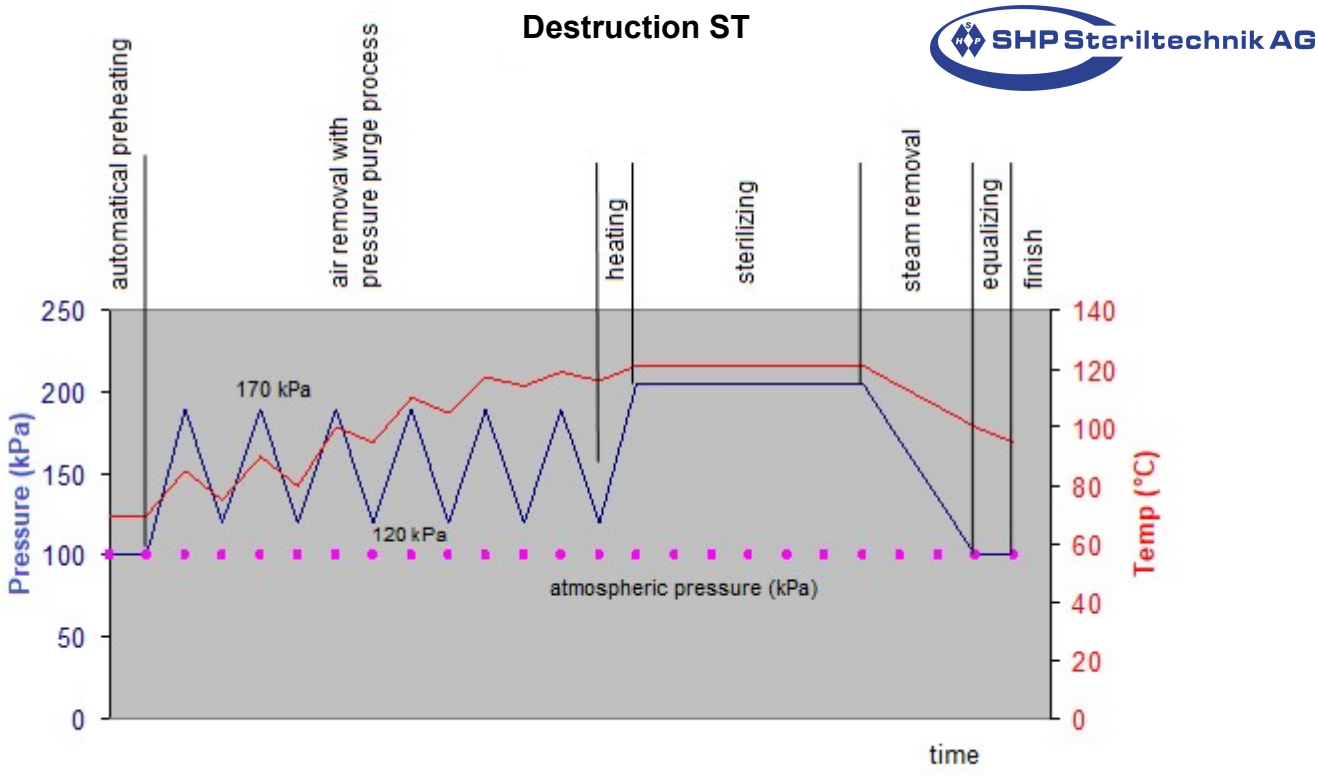
Optional with printer or touchdisplay

3. Programs available in steam sterilizer line Laboklav 55 - 195

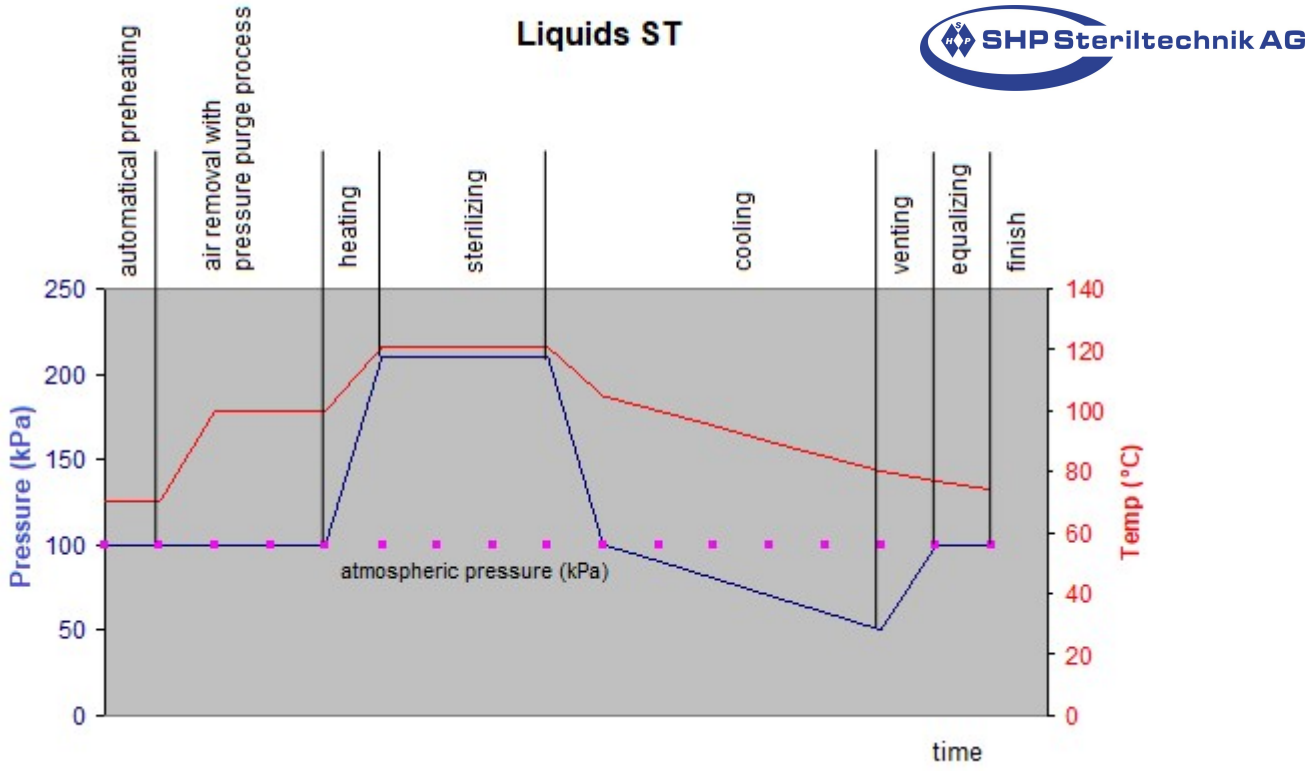
3.1. standard programs



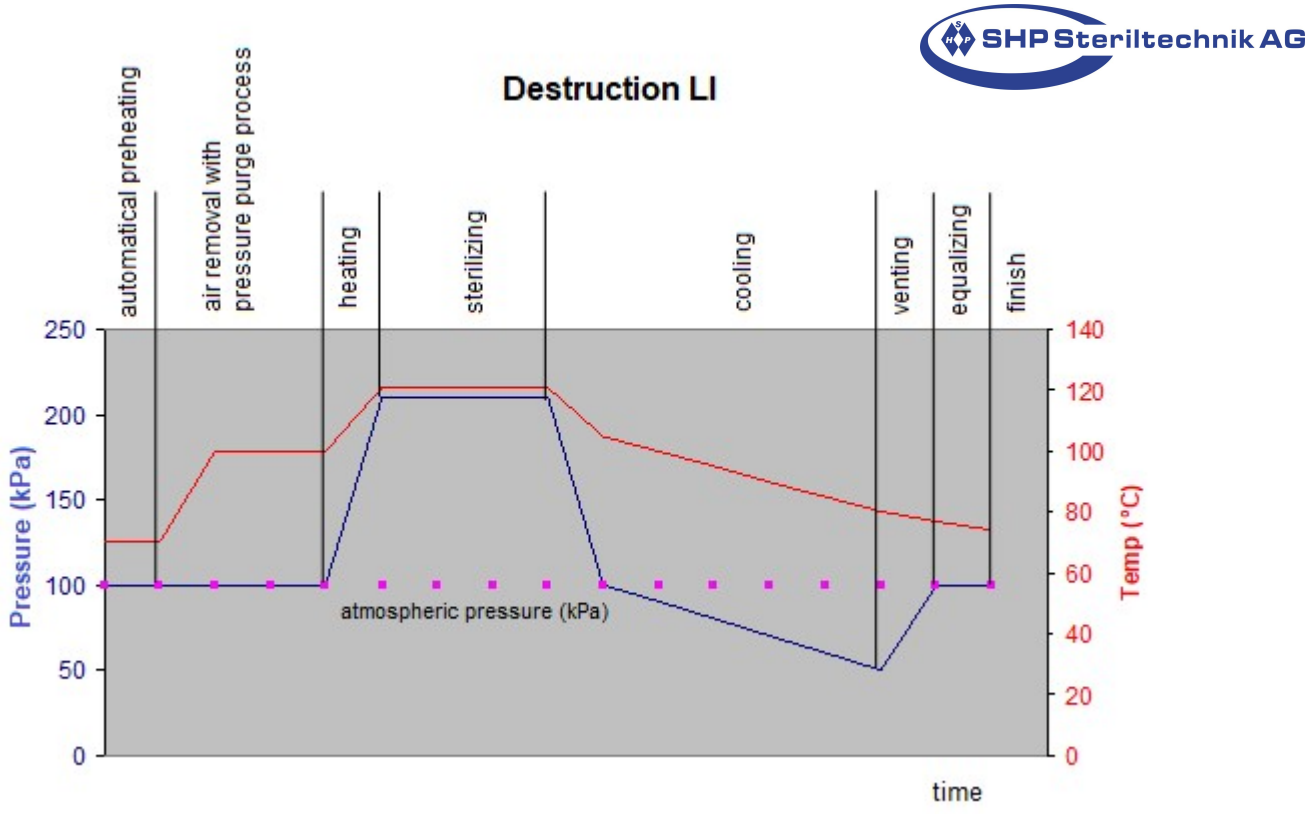
Program Instruments ST available in version Laboklav xxx B, M, MS und MSL



Program Destruction ST in version Laboklav xxx B, M, MS, MSL

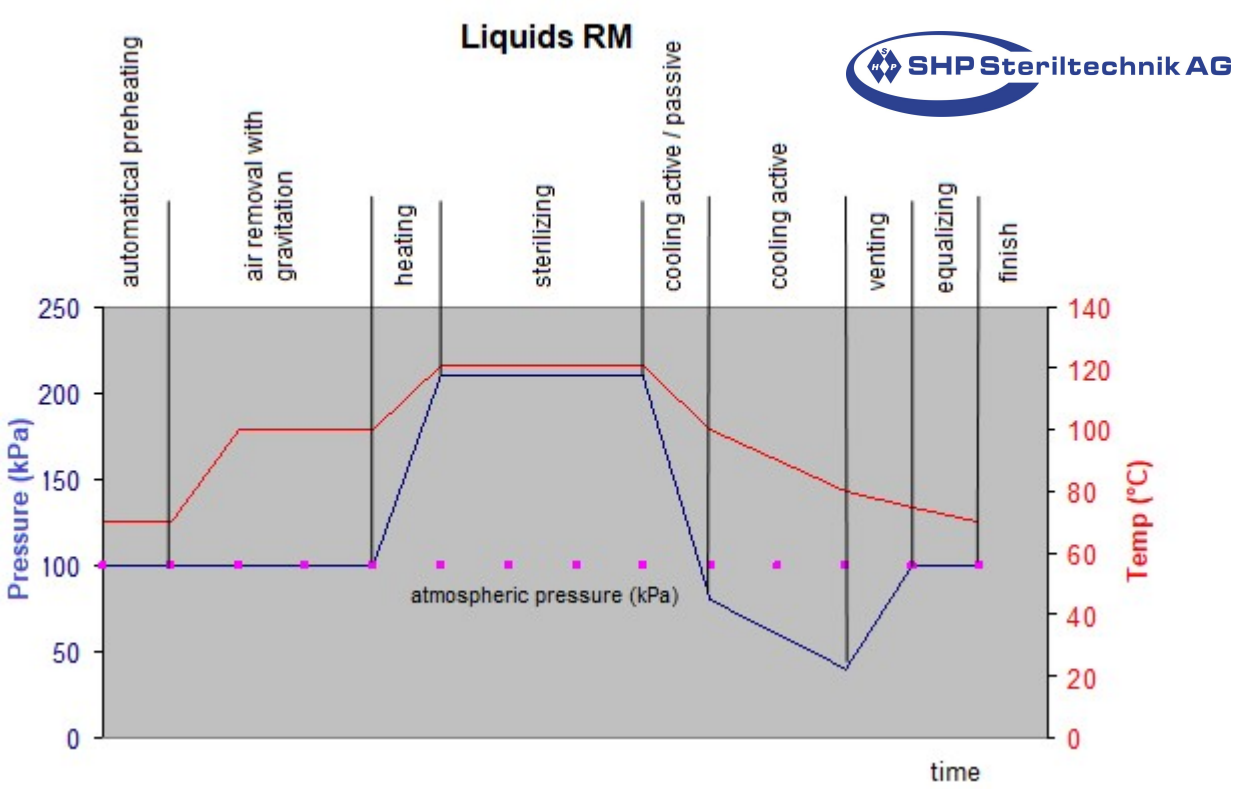


Program Liquids ST in version Laboklav xxx B und V

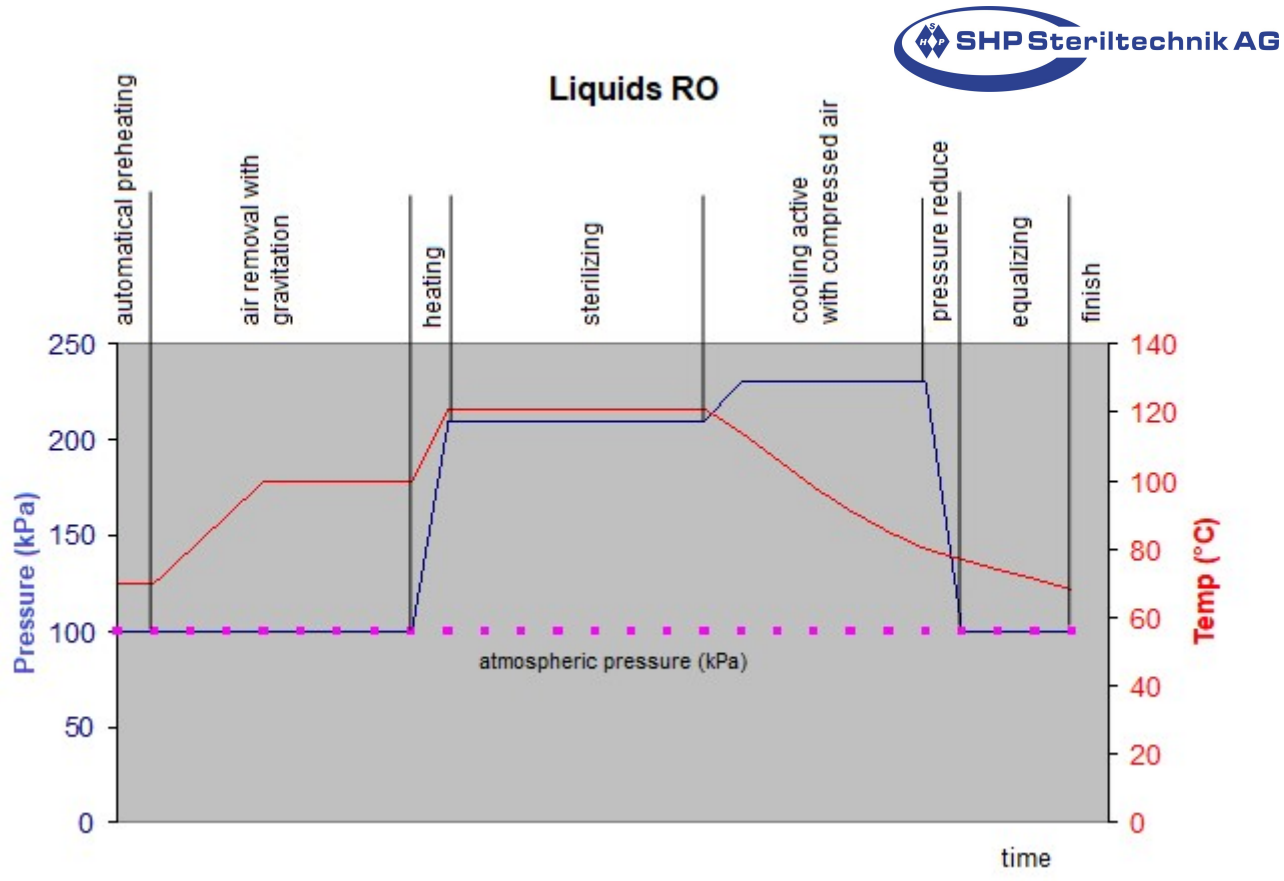


Program Destruction LI in all versions Laboklav xxx, in versions with cooling active fast cooling RM is activated (decreases the cooling time)

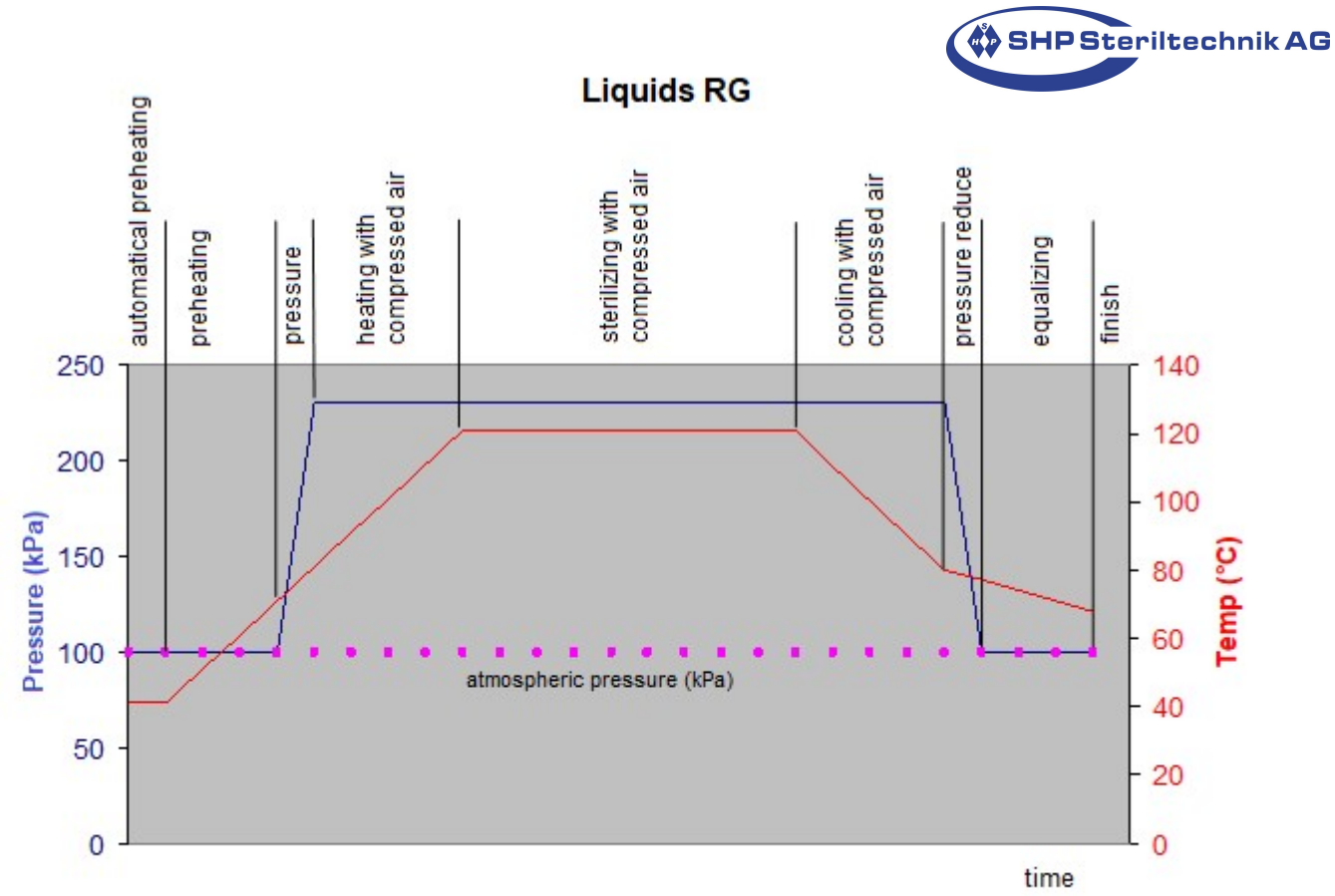
3.2. Programs with fast cooling



Program Liquids RM in version Laboklav xxx M, MS, MSL, MV, MSV und MSLV

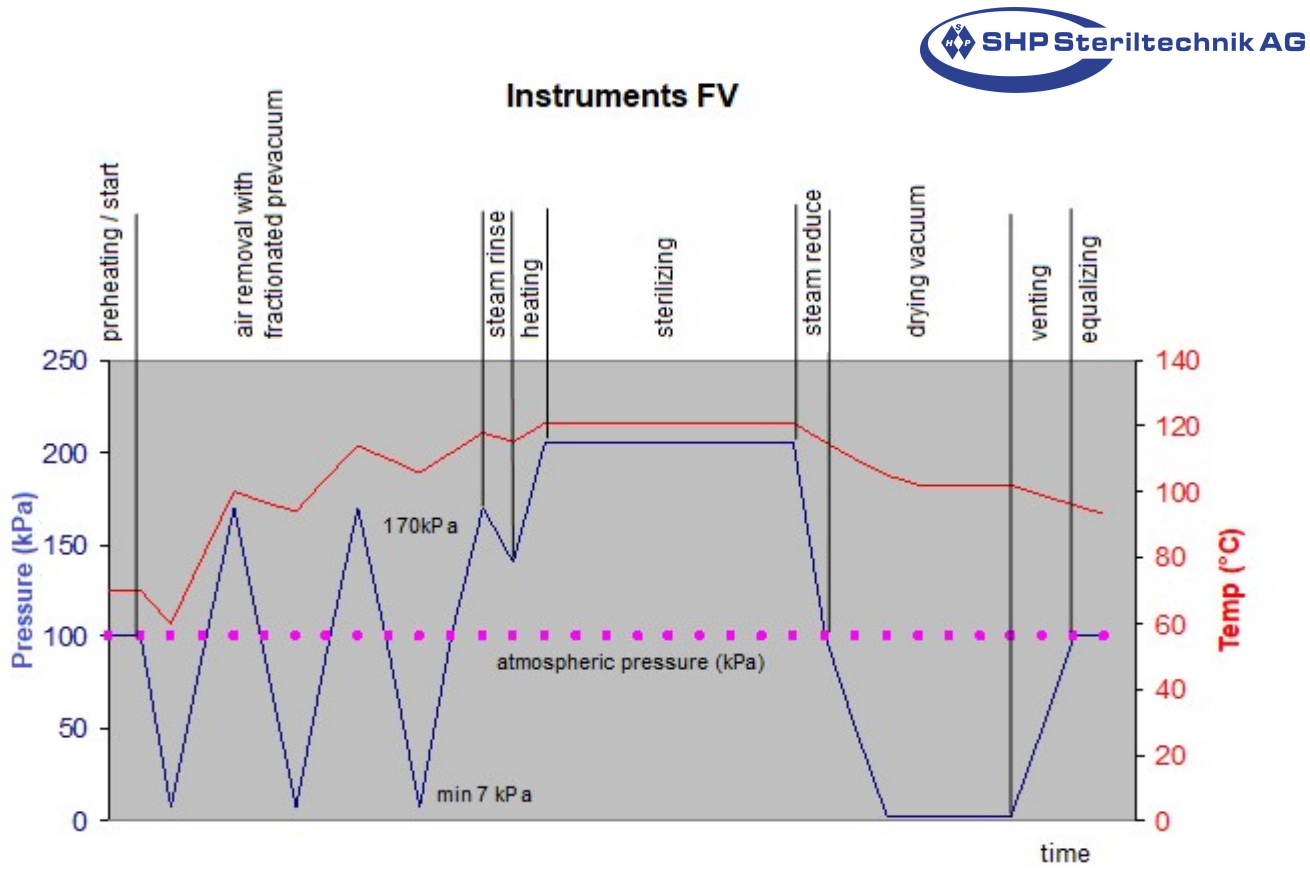


Program Liquids RO in version Laboklav xxx MS, MSL, MSV und MSLV



Program Liquids RG in version Laboklav xxx MSL und MSLV

3.3. Programs with vacuum (versions V, MV, MSV and MSLV)



Program Instruments FV in version Laboklav xxx V, MV, MSV und MSLV

3.4. Description of program steps

The sterilizing process in steam sterilizer line Laboklav xxx contains the following program steps:

- **Preheating**
The steam generator and, if programmed, the chamber is preheated until reaching a specified temperature. It takes about 5 to 10 minutes. If the chamber temperature is high enough, it decreases the preheating time or preheating is switched off.

- **Deaeration**
In all liquids programs a gravity deaeration is preselected automatically.
In versions B, M, MS and MSL - (no vacuum available) the deaeration for Instruments and Destruction is preselected as a pressure purge cycle. It works with 5 - 6 pressure purges between 170 and 120 kPa absolute pressure (number of pressure purges depends on start temperature).
In versions V, MV, MSV and MSLV the deaeration for instruments and destruction programs works with fractionated pre-vacuum.

- **Heating**
The chamber and the items to be sterilized are heated to the preselected temperature using steam; extra steam rinsing is usually not used.

- **Sterilizing**
While sterilization phase the unit is keeping the set temperature over the sterilization time. In case over lower temperature that set temperature, the timer for the sterilization time is stopping.

- **Pressure removal**
The steam is removing from chamber until reaching programmed pressure in the chamber.

- **Cooling**
This is programmed for liquids only. Depending on the integrated fast cooling options different cooling versions are possible: passive or active, in active cooling slow, fast or forced is possible.

- **Drying (for versions V, MV, MSV and MSLV only)**
Program is drying with vacuum with a programmed drying time. Alternate an intermitting venting and vacuum cycle is possible. The venting function is automatically using the venting air filter.

- **Venting**
The program is using for the venting function the integrated venting air filter automatically. The function works until reaching the programmed air pressure.

- **Equalizing**
For additional safety the device is waiting a few seconds after reaching the program finish to make sure that no measurement mistake has set the program to finish. Equalizing time depends on program and sterilization goods and can be different.

- **End of Program**
After the end of a program, the control waits for the operator to acknowledge the program! This state is indicated by a flashing display and a short acoustic signal. The acknowledgment is done by pressing the **stop button (11)**. The lid is unlocked automatically and then opened gradually.

3.5. Programs for testing

The **Bowie&Dick-Test** is proofing the process for steam penetration of the sterilization good (mainly for textiles or paper wrap). This test is implemented in vacuum option only. The test is normally for medical use only! The test body for this test should be an usable test package only.

The **vacuum test** is implemented in vacuum option only. It can be used for testing the leakage rate of the unit. For the normal use it is not necessary to run this test (implemented for service/maintenance). The test should run if the chamber is cold! The chamber temperature should be not higher than 40°C (otherwise it is impossible to start the test).

If the test result is "Incorrect" the unit should get a service / maintenance! In that case you should not use the device until qualified service stuff has checked the device!

3.6. Overview for predefined programs

All sterilization cycles are running automatically. The duration of a single cycle depends on the load, kind of deaeration, number of vacuum fractions in fractionated pre-vacuum and the start conditions (warm or cold), drying time, kind of cooling etc. Even so the type of sterilization goods and kind of loading the good inside the chamber have an enormous effect on the cycle time. In case of a validation you can define the goods and loads. Whenever the same good / load with same program and same parameters is started, the time depends mainly from start temperature.

Basically, the higher the mass of the load and the colder the items to be sterilized and the sterilization chamber, the longer the time per cycle.

The table gives an overview for the different preselected programs:

(Later changes are possible)

Prog.	Material	Deaeration	Steril. time	Steril. temp.	drying/cooling
P1 (B/M/MS/MSL) Instr. ST	Instruments	Pressure purge: 5-8x 170 kPa / 120 kPa	15 min	134°C	No drying
P1 (V/MV/MSV/MSLV) Instr. FV	Instruments	Vacuum + steam: 3x 30/70kPa / 140kPa	15 min	134°C	5 min
P2 (B/M/MS/MSL) Instr. ST	Instruments	Pressure purge: 5-8x 170 kPa / 120 kPa	15 min	134°C	No drying
P2 (V/MV/MSV/MSLV) Instr. FV	plastics (e.g. pipettes)	Vacuum + steam: 3x 30/70kPa / 140kPa	25 min	134°C	40 min
P3 (B/M/MS/MSL) Instr. ST	Plastics and gum ware	Pressure purge: 5-8x 170 kPa / 120 kPa	20 min	121°C	No drying
P3 (V/MV/MSV/MSLV) Instr. FV	Plastics and gum ware	Vacuum + steam: 3x 30/70kPa / 140kPa	20 min	121°C	15 min
P4 (B/M/MS/MSL) Destruction ST	Waste / Trash (solid mat. only!)	Pressure purge: 5-8x 170 kPa / 120 kPa	15 min	134°C	No drying
P4 (V/MV/MSV/MSLV) Destruction FV	Waste / Trash (solid mat. only!)	Vacuum + steam: 3x 30/70kPa / 140kPa	15 min	134°C	No drying
P5 (B/M/MS/MSL) Destruction ST	Waste / Trash (solid mat. only!)	Pressure purge: 5-8x 170 kPa / 120 kPa	15 min	134°C	No drying

P5 (V/MV/MSV/MSLV) Destruction FV	Waste / Trash (solid mat. only!)	Vacuum + steam: 3x 30/70kPa / 140kPa	15 min	134°C	2 min
P6 (all) Destruction LI	Unwrapped waste /Trash with liquids	Gravitation	15 min	134°C	slow/fast RM
P7 (all) Liquids ST	Liquids	Gravitation	20 min	121°C	Slow
P8 (B/V) Liquids ST	Liquids	Gravitation	20 min	121°C	Slow
P8 (all without B u.V) Liquids RM	Liquids	Gravitation	20 min	121°C	Fast
P9 (B/V) Liquids ST	Liquids	Gravitation	20 min	121°C	Slow
P9 (M/MV) Liquids RM	Liquids	Gravitation	20 min	121°C	Fast
P9 (MS/MSV/MSL/MSLV) Liquids RO	Liquids	Gravitation	20 min	121°C	Forced
P10 (B/V) Liquids ST	Liquids	Gravitation	20 min	121°C	Slow
P10 (M/MV/MS/MSV) Liquids RM	Liquids	Gravitation	20 min	121°C	Fast
P10 (MSL/MSLV) Liquids RG	Liquids	Gravitation	20 min	121°C	Forced Special
P11 – P20	Same like P1	Same like P1	like P1	like P1	like P1
P21	Bowie&Dick-Test	Vacuum + steam 3x 30/70kPa / 140kPa	3:30 min	134°C	
P22	Vacuum test	test phase			

4. Operating the steam sterilizer Laboklav 55 – 195

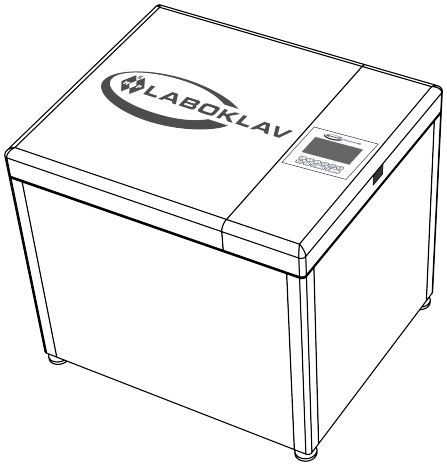
4.1. List of delivered parts

Device in ordered specification:

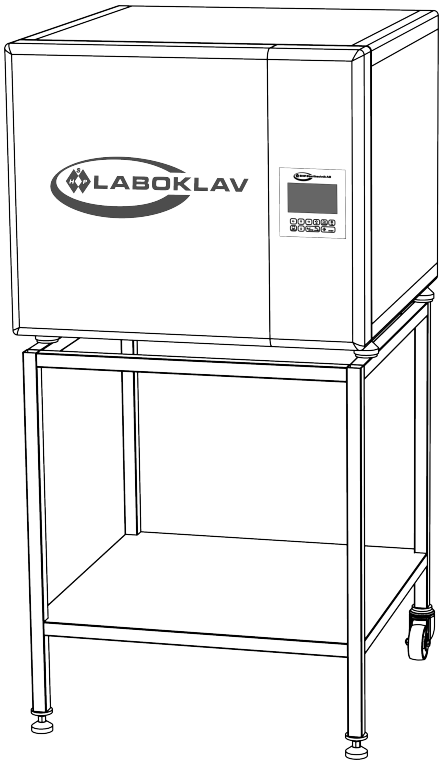
- Connecting pipes for water supply/ condensate remove
- Documents including user manual, pressure vessel papers (conformity declaration), safety valve calculation, warranty declaration

additional accessories are available on request:

- for standing-free units (=vertical orientation):
  - baskets and buckets with bottom insert
  - lift for baskets



- for bench-top units (=horizontal orientation):
  - base frame
  - bottom sheet
  - baskets
  - slide-in frame with bottom sheets
  - loading system



4.2. Installation

4.2.1. Power Supply

The steam sterilizer is equipped with a 3m long net supply cable. The device is configured to be connected to an electrical system **CEE 3P+N+GND with a voltage of 400V AC, 50 Hz, 16 A.** For commercial use we recommend to use an additional fault current protection switch. For fast switch off a central main power switch should be installed.

If the device is connected to a power supply with wrong or without correct ground connection it may endanger the operator of the device by dangerous electrical voltage.

Connecting the device to a power supply with lower capacity than 3x16 A may cause an overload or heating up the power cable and can also cause a fire!

OPTIONAL:
The device Laboklav 55 and 80 is optional configurable to be connected to an electrical system of **230V AC, 50 Hz, 16 A**

4.2.2. Water supply

The steam sterilizer needs demineralized or distilled water only! Please refer to Appendix C EN 13060 about water quality. Normal tape water / drinking water is not for use as feed water! (**see the quality definition → 12: Additional information**).

The device is prepared to be connected to a central feed water supply. Is this given please use the connection. So the refill of feed water inside the tank is automatically started by the unit. Manual refill is possible but not as comfortable as automatic refilling function. Pressure on water supply should be not less than 0.5 bar. The volume of the feed water tank is between 16 and 45 Liter.

Manual refilling is possible outside a program run only (lid must be open). If the unit gives an error message that water level is low in feed water tank, the program is not stopping. Program tries to finish the cycle.

Attention! Do not overfill the tank! If the maximum level is reached the control unit gives an alarm (if alarm is activated)!

The steam sterilizer is additionally using tap water for cooling the tank and the output. Output cooling is for protection of the house side installation of the drain. It should be connected if available!

manual filling:

- Switch on the device and open the lid. The manual filling mode is active.
- Unscrew the blind plug (a) and put it safely aside (b).
- Fill the device manually with deionized water by using a funnel.
- When the maximum filling level is reached, an acoustic signal sounds.
- Then screw the blind plug back on.
- Close the lid again.

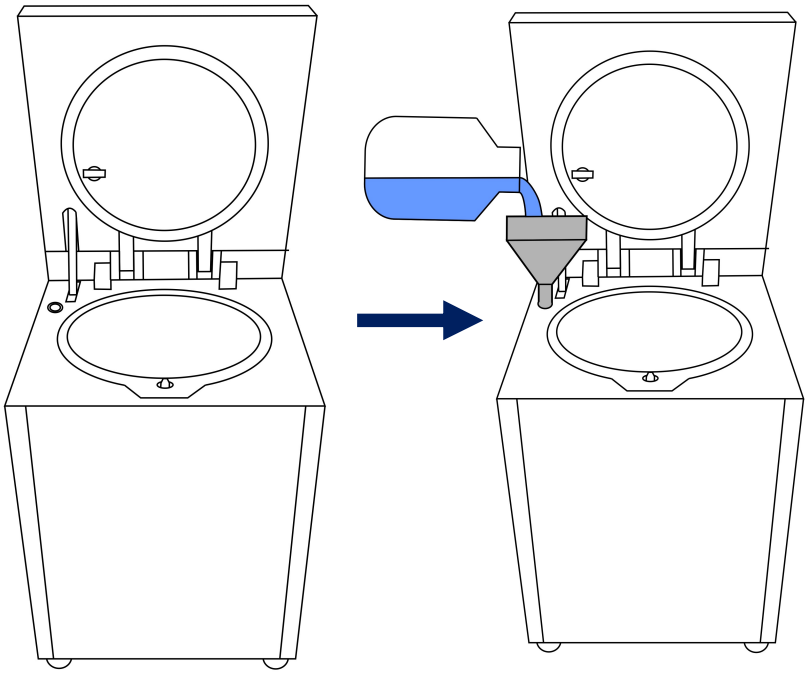


Figure: manual handfilling by usage of a funnel

a b

Figure (a, b): Unscrew the plug for manual filling

*

Pay attention to manual filling operation!

- For permanent operation of the device in manual filling mode, the device must first be opened on the side panel on the back and the check valve must be removed from the teflon hose on the water tank. This ensures that any air that may have formed can escape.
- If the device is later reconnected to the central demineralized water supply, the check valve must first be attached to the silicone hose on the water tank again (note the attachment direction: the arrow points towards the hose)

1. Remove side panel:

2. Remove check valve:

4.3. General information for operation

4.3.1. Control panel and key functions

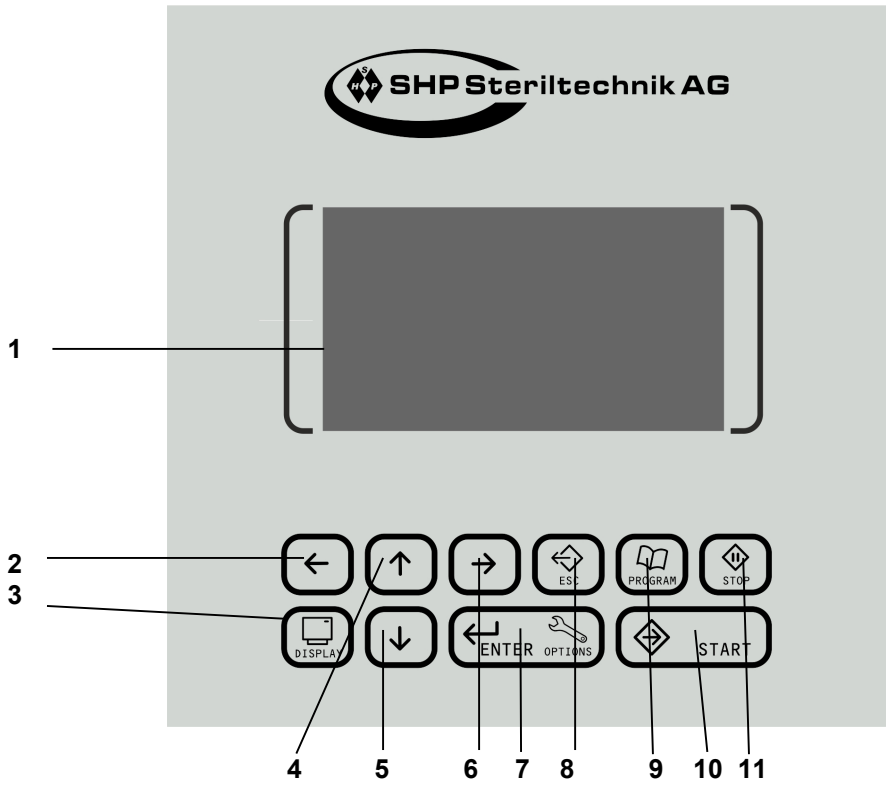


Figure: Control panel Laboklav 55-195 Standard

1 Display	displays program parameter, cycle data and error messages
2 Cursor button to left	moves cursor left
3 Display button	changes display from normal program display of actual sensor values, information about statistic data and software version
4 Cursor button up	moves cursor up and changes value at actual cursor position, open door
5 Cursor button down	moves cursor down and changes value at actual cursor position, closes the door
6 Cursor button right	moves cursor right
7 Enter button	enters the input data or entry in a menu
8 Escape button	for leaving a menu position after or before changing is valid
9 Program button	for entering the program menu to change the program, by using up and down button the program is chosen and activated by pressing the enter button
10 Start button	starts the actual in display shown program
11 Stop button	breaks a running program and quits the final signal after finishing a program regular or by manual break opening of the lid is possible after quitting the program only

4.3.2. Optional Touchscreen

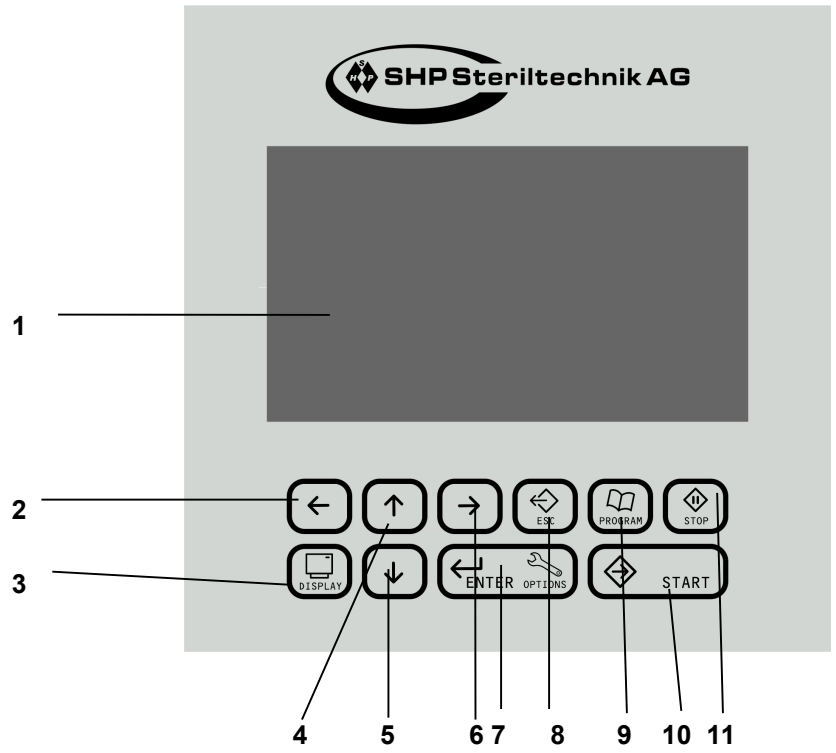


Figure: Control Panel Laboklav 55-195 with Touchscreen

The device is optionally equipped with an additional touch function. Due to the larger, coloured display and the possibility to operate it directly, working with the device is much more comfortable.
In addition, it offers extended options such as:

- Network connection to retrieve the device status and archive data at any time via internet browser (static IP is recommended)
- USB port for reading out the device archive via USB stick (FAT32 format)
- Output of the archive runs as PDF file incl. history diagram

All important user functions can be operated both via the control panel and the touch screen. The control panel has the same key functions as described in
→ **4.3.1. control panel and key functions** described.

4.4. First commissioning

Follow these steps one after the other to get the device started and running for the first time:

4.4.1. Setting up the device

You can set up the device yourself and put it into operation. It is essential to observe the following notes on setting up, installation and commissioning in this operating manual! It is recommended that the autoclave is set up, installed and commissioned by specialist personnel who has been authorized by SHP Steriltechnik AG for the first commissioning.

The sterilizer should be set up on a flat surface. When using the sterilizer as a table-top unit, the optionally available base frame should be used. **Please leave 10 cm of space between the rear and side walls of the device and the surroundings. The room should be well ventilated, the heat emission of the device to the surroundings should not be impeded.** The device should be aligned with the help of the adjustable feet so that the condensate can always drain into the chamber outlet. The snorkel should be set up accordingly.

Do not place the device immediately under a smoke detector! Otherwise, depending on the type of the detector, it may trigger a false alarm due to rising water steam. The device should therefore always be set up at least 3 meters away from the smoke detector. If necessary, the smoke detector should be replaced by a temperature-dependent fire alarm.

4.4.2. Switching on

After regular installation and connecting to media / power supply the device is ready for use.
Standing in front of the device you will find the main switch at the right side of the key pad.
By Switching on the main switch the display is switched on and shows the software version and the SHP Logo. When switched on, the device is ready for use.

Do not manipulate the device! If the device does not react please check the main breakers of the unit and of power supply. If no reason can be found please inform a trained service stuff to check the device internally.

After switching on and going into a program (without P12 – vacuum test) the device is preheating the steam generator when lid is closed!

4.4.3. Open the door/ lid

To open the device, press the **cursor up key (4)**. After initiating the opening process, you can release the button and step back from the device. The opening process takes place in 3 steps, whereby the device moves to a safe state, forming a forced gap. Any residual pressure in the chamber can be safely reduced. The opening process is automatically initiated when a program end signal is acknowledged.

Do not be alarmed if you occasionally hear a loud noise (bang) during the opening process. This noise is normal and is caused by the lid gasket separating from the lid rim.

The chamber door can only be opened when the device is ready for operation after the device has been successfully switched on!

⚠	**The chamber can only be opened, if there is no excess pressure in the chamber. In this case (e.g. the door is closed when the chamber is hot, the air heats up, a chamber pressure >120kPa is created) the door opening is not possible and an error message appears. The device waits until the pressure is released again. Only then the door can be opened.**

⚠	**Caution with negative pressure in the chamber!** **In this case, it is not possible to open the door immediately after switching on the device!** **This happens e.g. if the device is switched off in the evening after the end of the program without acknowledgment (door remains closed) because it cools down overnight and a vacuum is created in the chamber. It is only possible to open the door again after a short wait when the vacuum in the active program is balanced by ventilation.**

4.4.4. Loading the device

We recommend for free standing unit the use of the optionally available loading systems such as wire basket, open bucket (corresponds to wire basket with collecting tray), closed bucket or closed bucket with lid.
For use as a tabletop device, we recommend the mesh basket or the closed tub from our range of accessories. At least the bottom sheet should be used to avoid contact of the items to be sterilized with the condensate on the chamber floor.

⚠	**When loading or unloading the device, make sure that the surfaces of the device, the chamber, the loading systems or the items to be sterilized can be very hot. There is a risk of scalding!**

☞	**Use suitable protective equipment, e.g. heat-insulating gloves and protective clothing.**

4.4.5. Close the door/ lid

To close the device, press the door/ lid carefully against the locking spindle with your left hand while pressing the **cursor down key (5)** with your right hand. Keep this button pressed until the closing process is completed. You can see this on the display by the lock symbol, which now signals a closed device, and the warning tone can no longer be heard. The closing process runs in 3 steps! **Keep the cursor down key pressed all the time!** If you release the button without closing the lid completely, you have to open the lid again before you can close it again (dead man circuit as a safety element).

If you or others are in danger of pinching your fingers or anything else, release the cursor down key! The closing process stops automatically. In an emergency, switch off the device completely using the power switch on the right of the control panel!

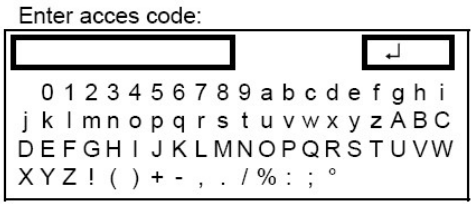
⚠	**When closing, make sure that no parts are trapped between the door and the seal!**

⚠	**Do not open and close the door by force, as this can damage the door mechanism!** **Safe operation cannot be guaranteed if damaged.**

4.4.6. Select a program

Program selection

Activating a program is done by pressing **program button (9).** It opens the program menu. With the **button up (4) and down button (5)** the right program is chosen by pressing the **enter button (7)**. All programs which are marked with a key symbol needs entering a code before activation:



The cursor buttons navigate the cursor. Up and down button changes the value. The **enter button (7)** must be pressed to confirm the code.

2. Display level

In second display level the actual value of all installed sensors is shown.
You can switch to a second display level with the **display key (3).** The values of other sensors are displayed here.

	14:45:00 Mo 29.03.2022	
1. Tk	16.1	°C
2. Tr	16.1	°C
3. Pk	100.3	kPa
5. Tf	16.1	°C
6 .To	16.1	°C
7. Tm	16.1	°C
8. Pg	100.3	kPa
9. Wq	2.1	uS

The symbols show the following sensors:

- Tk – chamber temperature,
- Tr – reference temperature,
- Pk – chamber pressure,
- Tg – temperature steam generator,
- Tf – temperature in filter cartridge (Option FA only),
- To – temperature in the steam / condensate outlet,
- Tm – temperature in the outlet of heating / cooling jacket (not in all options)
- Pg – pressure of steam generator
- Wq – water conductance

for touch operation:

A program is selected by pressing the **program selection keys (9).** The program selection menu opens. Use the cursor keys **"up" (4)** and **"down" (5)** or the touch screen (scroll) to select the desired program and confirm the program selection by pressing the **Enter key (7)** or by tapping on the respective program, and close the program selection menu again.

Startup screen

Program selection menu

Please note that programs marked with a key can only be selected after confirmation of a code key.

enter code key

The **display button (3)** can be used to change to a **second display level**. The values of further sensors are displayed here.

4.4.7. Program start

After selection of a program press the **start button (10)** and then the chosen program starts. Depending on the program and the temperature in chamber the device starts directly or starts with pre-heating to realize standard start conditions.

4.4.8. STOP Button

Each program can also be cancelled after the user has started it by pressing the **stop button (11).** Before the device is actually stopped, it asks whether it should actually do this. If you confirm this by pressing the **stop button (11)** again, the device automatically goes to the end of the program, reduces the chamber pressure and goes into the compensation phase. If the removal criteria are met, the control waits for the program to be acknowledged. Only then the device can be opened. The acknowledgment is made by pressing the **stop button (11)** again.

A canceled program is generally to be regarded as faulty! If the device is in a liquid program in the cooling phase, the program can no longer be canceled. The cooling phase must be run through before the device can end the program.

The different termination options depend on the type of program selected and the state in which the device is at the time the program was terminated.

Particular attention is paid to the state of the thermo lock when using a fluid program. The thermal lock is activated when the temperature for safe removal, defined in the parameters of the compensation phase, has been exceeded at the reference point. Then it is not possible to open the chamber immediately after termination! The condition for safe removal must then be reached. As a rule, this is achieved by self-cooling!

⚠	**If the program is terminated before the end of the sterilization phase, the items to be sterilized are considered to be "non-sterile" and must be declared and treated accordingly!**

If a program termination is initialized in an instrument program with final drying, the items to be sterilized and the chamber are then wet! In this state, the items to be sterilized cannot be stored for longer than 2 hours even if the sterilization has been carried out correctly! If possible, the chamber should be dried before starting the program again.

	**Use the program break for emergency break only! The device will try to finish the program regularly even it finds an error! So breaking a program is not necessary in each case of error message.**

4.4.9. End of program

After successfully running the selected program, it is ended.

After the end of a program, the control waits for the operator to acknowledge the program!

This state is indicated by a flashing green display and a short acoustic signal. Acknowledgment is done by pressing the **STOP button (11).** After a further 3 seconds the door is automatically unlocked.

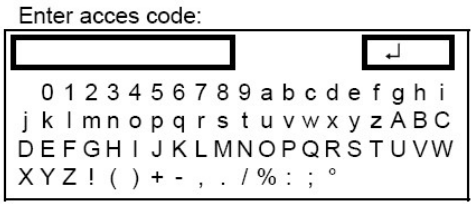
⚠	**Hot steam can escape when the chamber is opened!** **Wait until the steam has completely escaped and the chamber cools down before you remove the sterilized items.**

After completing the program, please note the following when removing the sterile goods:

- Never open the door with force. The autoclave could be damaged and hot steam could escape
- Do not touch the sterile items, the kettle or the door with unprotected hands.
  The parts can be hot.

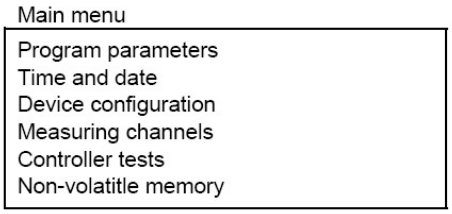
4.4.10. Changing program parameters

To change program parameters press the **Enter button (7)**. You reach the code menu.
Give the **code 2000** to the menu and confirm with Enter button again.
To navigate through the menu use the cursor buttons.

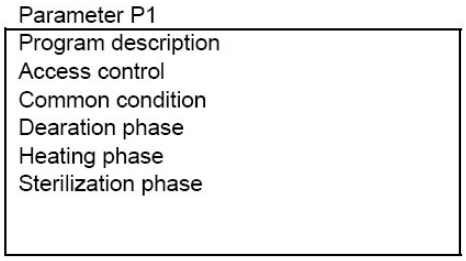


If the code was correct you reach the main menu. Depending on the access level defined by the code the main menu shows different submenus.

In the picture you find the maximum main menu, by giving the code 2000 you find the program parameter point only.



Enter the point program parameters. Inside the submenu go to the program you want to change.



Inside this submenu you can choose the program phase that should be changed directly.

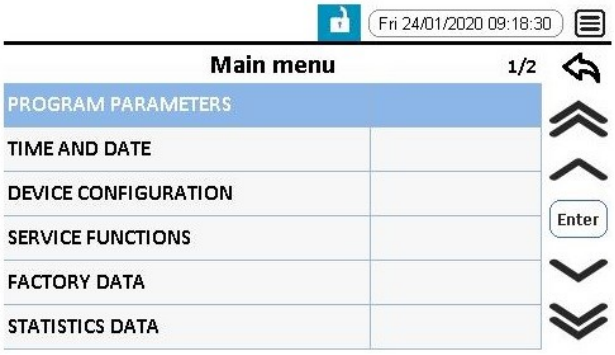
Change Program parameters only if the result gives a real advantage! The preprogrammed sterilization cycles are validated for empty chamber and full loaded chamber. For the normal use, the 10 preprogrammed cycles should be enough. If there is any doubt about the adequate sterilization performance, the changed program must be validated!

When all programs are configured you should run and test the program with empty chamber and full loaded chamber to be sure the program parameters do not make problems in normal cycle run. If there are doubts, you should make a full validation of the program.

for touch operation changing program parameters:

If you enter your access code correctly, you will enter the main menu. Different menu items are displayed depending on the access level. Special menus are reserved exclusively for authorized technicians. On the level "responsible operator" you will find the entries Program parameters to Device configuration. At the "user level" **(Code 2000)**, only the menu items Program parameters and Set clock are displayed.

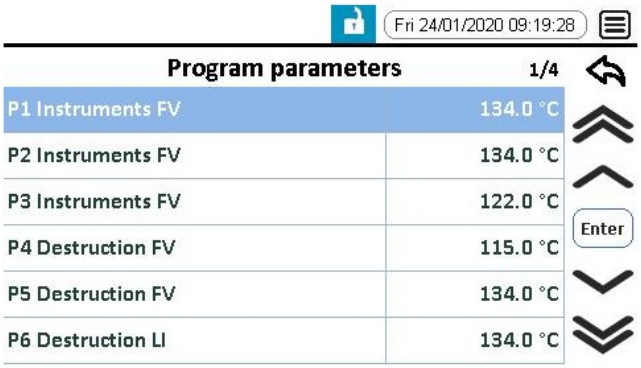
enter code key



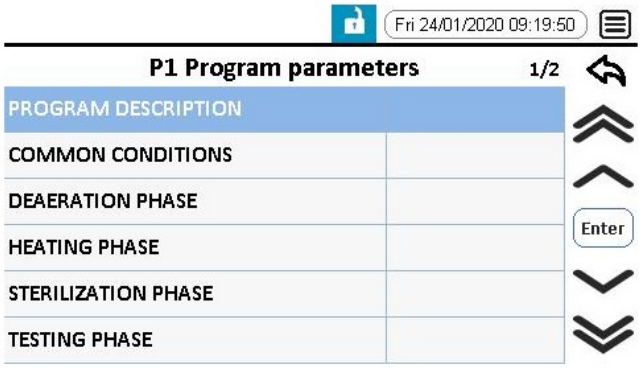
main menu

For example, to change the program parameters for touch operation press "Program parameters" in the main menu.

A list of the available programs appears. Select the one you wish to change. Depending on the access level selected, the corresponding available parameters for changing the program will appear.



In this menu you can directly select the program phase to be changed.

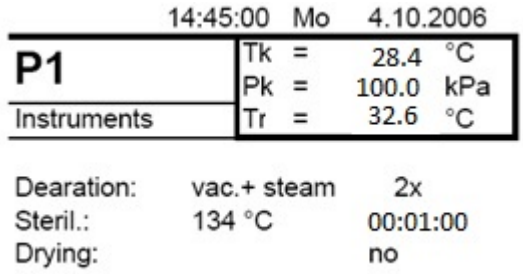


5. Sterilization cycle progress

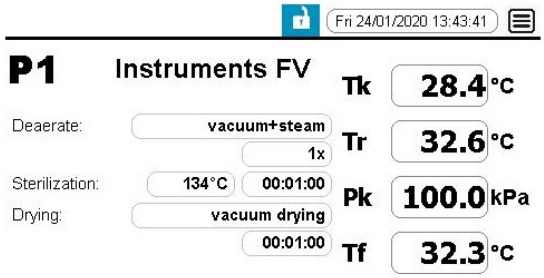
The program cycle is running fully automatically. The display shows the actual program cycle and gives information what is the actual situation in the running program phase.

The successful finish of sterilization cycle will be displayed. In case of an incorrect cycle additionally sounds an acoustic signal.

In the following the typical display are described:

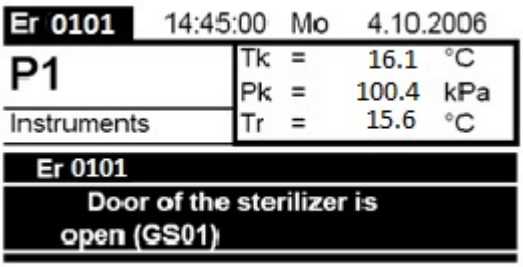


Touchscreen (optional):



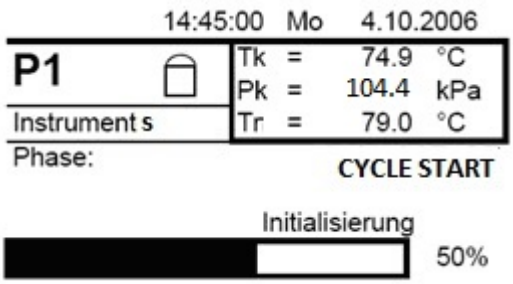
The steam sterilizer is switched on, program P1 is activated but not started. The device is ready for start. If the door is closed, the device is preheating the steam generator automatically.

The display shows program no. P1. Here the program type is shown, if special program name was given it will replace the program type. The main program parameters are shown for fast identification of the program cycle. In the picture the display shows Program type Instruments, with deaeration fractionated pre-vacuum starting with vacuum followed by steam injection 2 times. Sterilization is programmed for 134°C, 4 min. sterilization time. Drying function is not programmed. In the sensor window the main sensor values are shown.

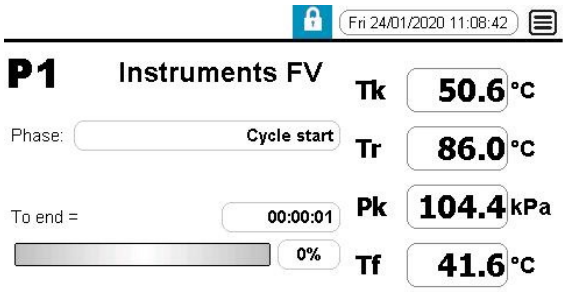


Touchscreen (optional)

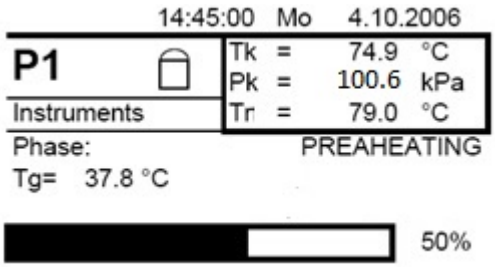
Example for an error: The program P1 was started but lid was not completely closed. So the device generates an error message. The error message can be cleared by pressing the Escape button if the cause of the error was cleared.



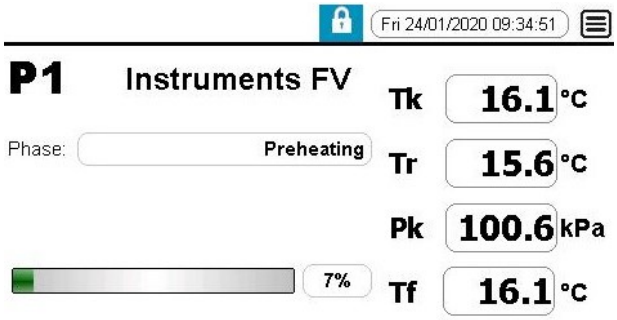
Touchscreen (optional):



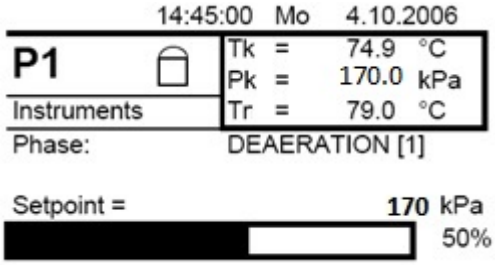
The device was started up properly and a program was started.



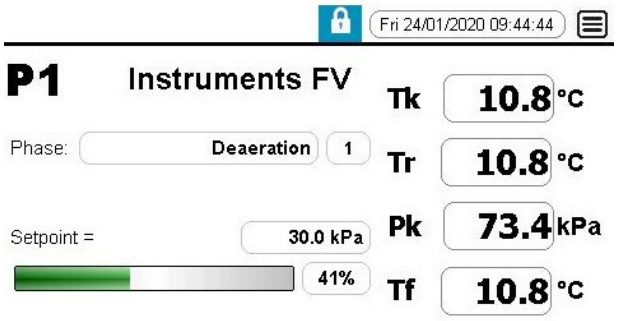
Touchscreen (optional):



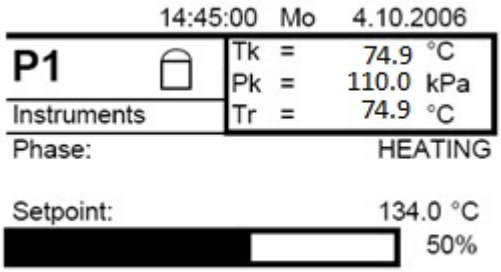
The cycle was started regularly, the temperature was low so unit starts with preheating. Instead of Tm1 / Tm2 the jacket temperature Tm is shown (only for option with vacuum and / or fast cooling)



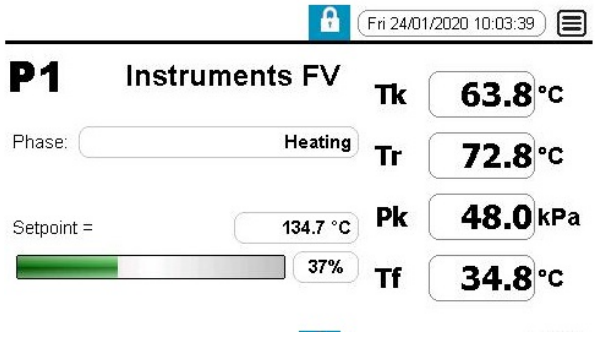
Touchscreen (optional):



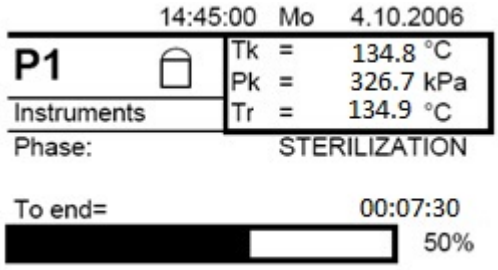
The program was started regularly and is now in deaeration phase step 1.



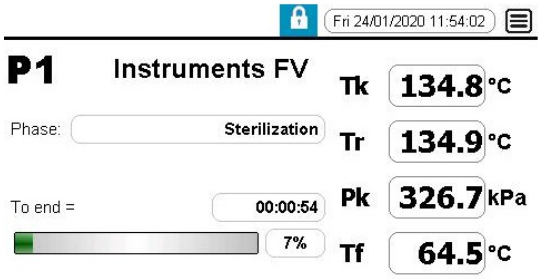
Touchscreen (optional):



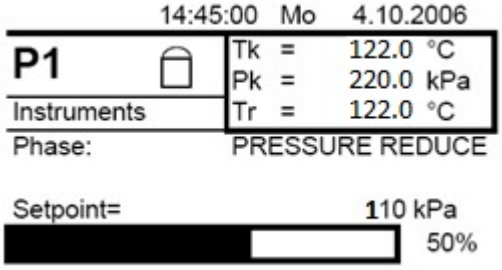
Deaeration has finished, the program is now in the heating phase. Set point for finish of this phase is reaching the 134°C chamber temperature.



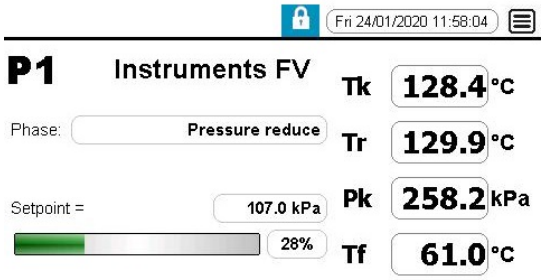
Touchscreen (optional):



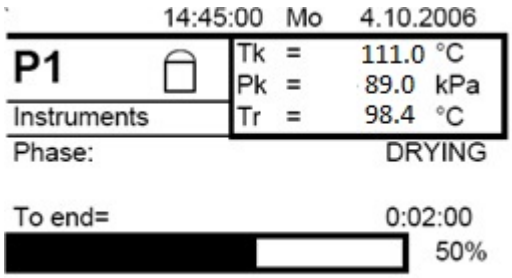
The sterilizer is in sterilization phase, 2 minutes before finish of this phase.



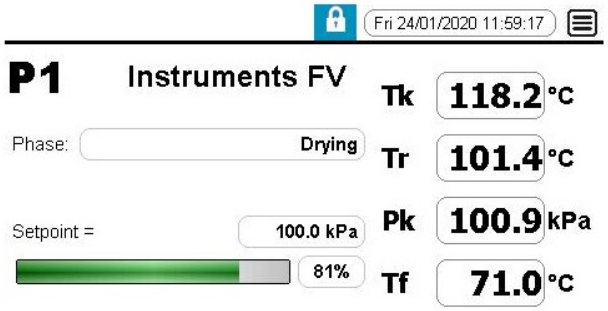
Touchscreen (optional):

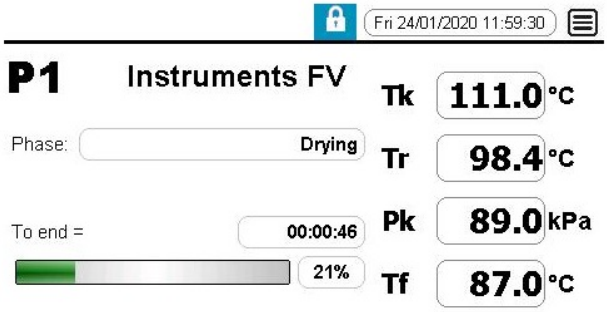


Sterilization phase has finished, now the chamber pressure will be reduced until reaching 110 kPa in chamber.

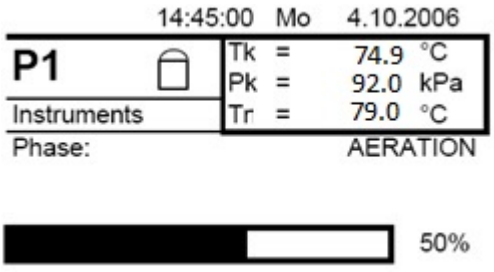


Touchscreen (optional):

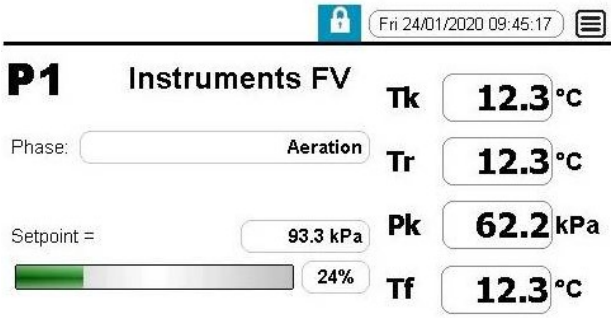




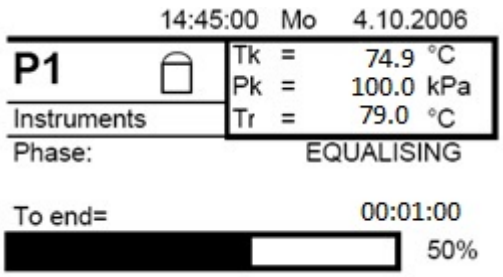
Chamber pressure was reduced lower than 100 kPa, pressure reduce phase has finished, now the device is in drying phase (vacuum pump is running). Drying is not available in units without vacuum pump!



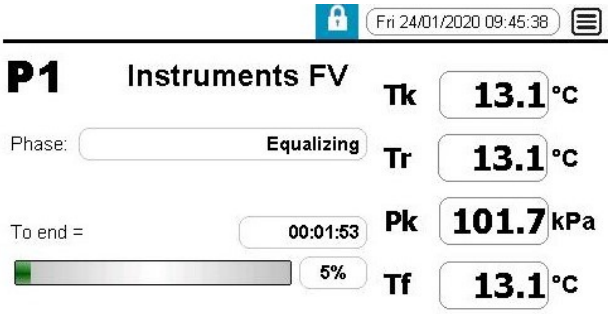
Touchscreen (optional):



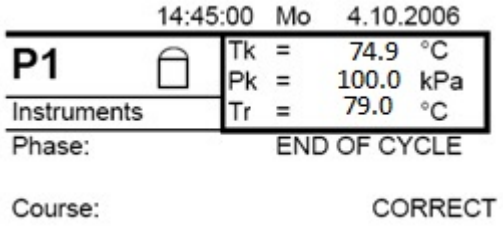
Drying time is over, now the chamber is venting until reaching set point.



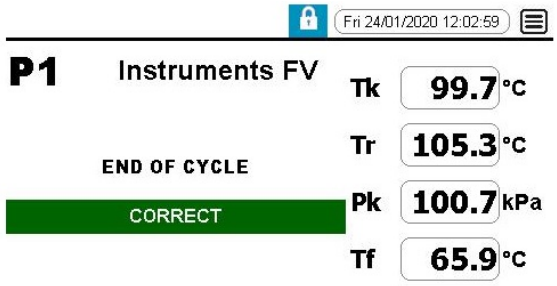
Touchscreen (optional):



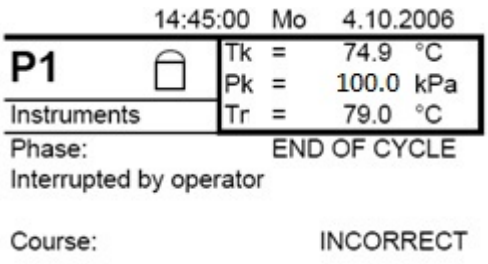
Venting the chamber has finished. An additional time is running for safety.



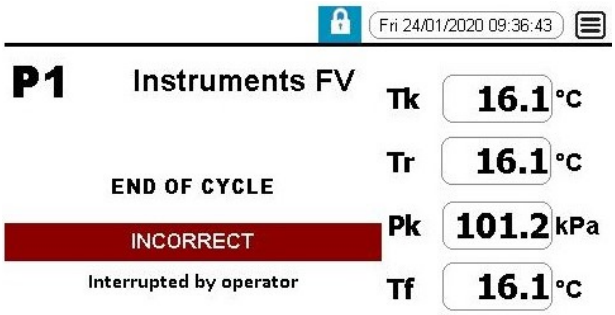
Touchscreen (optional):



The program cycle has finished successfully. The sterilizer gives the result as correct cycle. Now the program needs to be quit by pressing the Stop button. Then the lid can be opened and the sterilization good can be removed from chamber.



Touchscreen (optional):



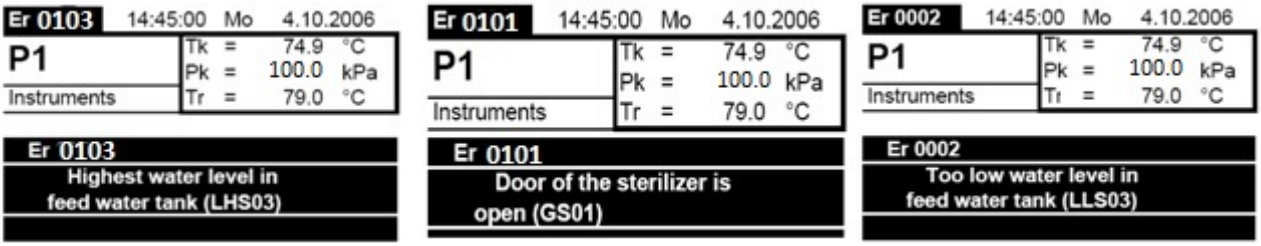
In case of a not successful or broken program the sterilizer shows the following message:

Before regular end of cycle a break was initialized. May be by hand or automatically. In case of automatic break an error message is additionally shown.

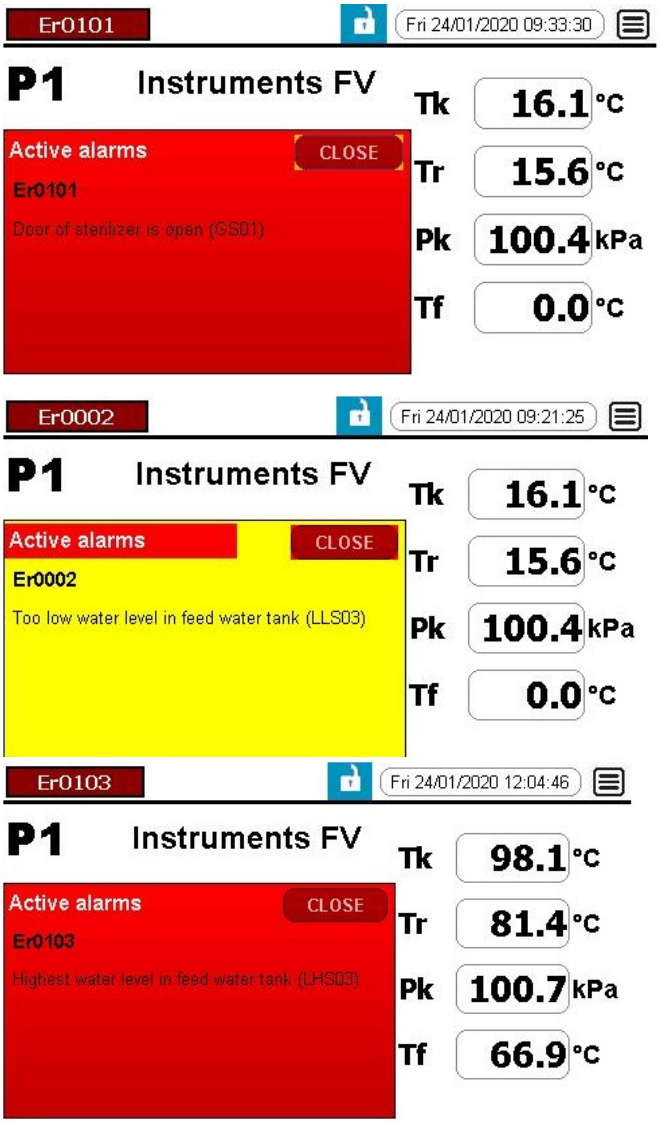
6. Error handling

The following errors can occur, which the device does not classify as serious, since they definitely represent normal operating states. Since the conditions can mean that a program may no longer be able to be terminated or lead to serious faults, it is no longer possible to start the program in this situation. If they occur while a program is running, these errors do not lead to the program being aborted but only to inform the operator.

The following simple errors will not influence a program by breaking and are not real mistakes in process control. The errors make it impossible to start a program, the reason why it was generated needs to be removed before next start.



for touch operation:



An error list is included in the documentation folder of the device.

In the event of a fault a corresponding error message is shown on the display. If the error cannot be remedied independently, contact the customer service.

7. Operating the sterilizer - general information

7.1. Preheating the chamber

After switching on the unit it is in a waiting modus. After selecting a program the unit changes into a standby modus and activates automatic preheating function. This function is automatically preheating the steam generator if the lid is closed. Jacket preheating starts in special programs only if it is activated.

7.2. Preparation of sterilization goods

Solid sterilization goods should be cleaned before sterilizing. Cleaning is a basic part of sterilization process. It reduces the numbers of microorganism on the surface. The sterilization is not a cleaning process! Microorganism will be killed or deactivated but the rest of material that the microorganism consists of will be on the surface after the sterilization has finished! Often these particles act as pyrogenes!

Solid sterilization goods should be cleaned before sterilization! Only this gives warranty of a high quality sterilization cycle!

For wrapping the sterilization goods the wrapping material should be convenient to use as wrapping material! The wrapping should be closed over the complete cycle to protect the goods against recontamination after sterilization has finished. For waste material in a waste bag the opposite is valid. Waste bags should be opened or should open under vacuum! This is necessary to make sure the steam comes in direct contact with sterilization good. If there are doubts that the sterilization process runs without complications it should be validated!

Wrapped and porous material should be sterilized with vacuum program only! Waste bags are a kind of wrapping material! To sterilized waste in a waste bag a vacuum program is the best deaeration process. Pressure purge process may be not enough for good deaeration.

Especially when sterilizing wrapped goods it is necessary to keep the load in the same kind it was validated. The single packages should not lay inside to close to the next. Deaeration and drying function depend on the kind of loading! If the steam cannot reach the good evenly, the heating power will create temperature differences!

Heavy good should lay on the ground of the chamber, lighter goods should lay upstairs. In each program cycle the loads should be from the same type. The deaeration type should respect the heaviest and most complicate load! A mixture of solid and liquid loads should be avoided.

The maximum loads are defined **see → "technical data".** Please refer to this chapter to see the maximum load of each type of load!

Liquids may only be sterilized if a thermal barrier is active. This happens automatically in all liquid programs. Therefore only use the corresponding liquid programs for liquids! In order to ensure the correct functioning of the thermo lock and the corresponding program, it is necessary that the reference sensor is placed in a vessel containing as much water as its largest individual volume in the chamber!

⚠	**If the reference sensor is not positioned correctly or is even outside of the reference vessel, there may be delayed boiling when the device is opened, resulting in scalding injuries. In addition, the sterilization time is triggered too early!**

⚠	**Attention please while using hot liquids! While contact with hot liquids with temperature of more than 60°C it can burn the skin!**

⚠	**Attention please while handling closed waste bags! If the unit is not equipped with vacuum the waste needs to be opened while loaded into the chamber. While opening the waste bag bio aerosols will come free and may infect the operator! Operate the device in the right protection clothes only! Protect your skin, your face especially eyes, nose, mouth!**

7.3. Removal of condensate

To remove the condensate the unit is equipped with an outlet to connect to a drainage system. If the unit is connected with cold water supply the program is automatically protecting the condensate drain against overheating by direct draining with hot steam.

If there is no possibility of disposal, we offer you the option of purchasing appropriate condensate collection containers. Ask your dealer or contact us directly.

8. Documentation of sterilization cycles

The device is prepared for various types of process documentation. On the one hand, each process can record the relevant process data directly on paper using a built-in printer. At the same time, the device contains a memory that stores between 30 and 50 cycles depending on the number of analog channels defined for documentation and the number of values to be saved per time unit. This data can also be subsequently printed out with the printer. If the memory is full, the implementations on the data in memory are automatically overwritten. In addition, the process data can be directly read out and archived using electronic documentation software called **SegoSoft** and a special data cable.

The cycles can be assigned accordingly using the date and time. You can obtain separate instructions for **SegoSoft** from customer service on request or you can find them in the customer center on the website: www.shp-steriltechnik.de

Parallel use of both types of documentation is also possible.

When equipped with a **touch display**, it is no longer possible to use a printer and the **SegoSoft** software. Instead, data of up to 999 cycles is stored on an internal MicroSD card and can be accessed at any time (when the device is in switched-on standby mode) via network or USB stick (please use a FAT32 formatted stick, then it will start the data is automatically backed up on it; **do not leave the stick plugged in, it is only read out immediately after plugging it in or plugging it out and plugging it in again!)**.

After reaching 999 cycles, the archive must be deleted in order to be able to save new cycles again.

The printer is available as an integrated device, which is connected to the device via a serial RS 232 interface. The printer allows all relevant process parameters to be printed out during the cycle run or afterwards.

The printer also enables the subsequent printing of process data directly from the memory. To do this, select the Archive functions submenu in the main menu.

The printer should have enough paper.
When the paper roll is used up, the printer switches off automatically.

9. Decommissioning

If you want to take the device out of operation for a long time (e.g. due to a vacation or a planned transport), proceed as follows:

- The chamber door should not be completely closed, but only leaned against the locking spindle so that the inside of the chamber can dry.
- If there is a large amount of liquid in the chamber, it is advisable to remove it manually (always pay attention to suitable protective clothing)
- Empty the storage tank by using the drain hose on the quick coupling provided.
- If necessary, empty the vacuum pump by using the drain plug on the pump head.
- All supply lines such as cold water, demineralized water, compressed air and waste water should be closed.
- Disconnect the device from the mains.

10. Maintenance

The sterilizer should get regular cleaning, maintenance and service. Some parts are regular to be changed completely to protect the device against damage or mistakes in sterilization cycle. The simple cleaning and maintenance activities can be done by the operator without problems.

Special services can be done by specially trained service stuff only! All inspection activities acc. to pressure vessel regulations / local regulations for pressure vessels and electrical installations need special trained service staff! We recommend to order one regular safety inspection per year and to connect this with a regular maintenance for the vessel, pressure parts and electrical installations. Your distributer is authorized to recommend a trained service partner.

We recommend you to use a device book that helps to document all cleaning, maintenance and service repair activities at the device.

Maintenance or repair activities that need to open the housing are not allowed to be done by untrained personnel staff!

For maintenance or repair activities that need to open the housing the electrical power supply must be disconnected! Inside the housing dangerous electrical voltage can kill or hurt!

After work at electrical installations some electrical test are necessary to do. Please respect the local rules and regulations!

10.1. Regular cleaning, maintenance and service activities

activity	Recommended time					notes
	daily	weekly	monthly	half year	yearly	
Cleaning the surface of chamber ring	X					
Cleaning chamber inside	X					Especially after over boiling of sugar or agar solution
Cleaning baskets		X				
Cleaning trays and bottom sheets			X			
Cleaning lid seal and check for damages	X					Change lid seal if damaged (SERVICE)
Cleaning the device outside	X	X	X	X	X	As required, recommendation: daily
Check the safety valve(s)				X		SERVICE
Check the in/out connections		X	X			
Change the venting air filter			X	X	X	After message by device
Function test for the valves					X	SERVICE
Cleaning the tank					X	SERVICE
Functional test of vacuum pump					X	SERVICE
Check program parameters				X	X	
Check for lid / door adjustment					X	SERVICE
Check steam generator					X	SERVICE
Electrical test					X	SERVICE
Attention please! Opening the unit is allowed for authorized and trained service stuff only! **If other intervals are prescribed at the place of use according to national law, then these inspection periods and periods must be observed!**						

The vessel has to undergo regular inspections and tests according to the current laws and regulations. We advise you to have an inspection of the vessel jacket regularly to check any corrosion. Such inspection has to be undertaken by an authorized person of our company.

Attention: Please pay attention when the lowest stress cycle has reached the half amount you have to inspect the pressure vessel. The inspection has to be done in Germany due to BetrSichV not later than 10 years. Out of Germany local regulations have to be obeyed.

10.2. Cleaning

⚠	**Before starting with cleaning the device please disconnect the unit from power supply completely! Cleaning should be done if the unit was cooling down only! Danger if the chamber is hot!**

- **Cleaning the surface of chamber ring** – Clean hat area regular! That area is necessary for closing and sealing the chamber completely. Use a wet towel or textile cotton material for cleaning. In case of hard waste in the surface you can use the hard side of house hold eraser. Do not use aggressive chemicals or organic solutions like alcohol, benzine or acetone.

	**Do not use aggressive chemicals or rough cleaning materials for cleaning the metal surface!**

- **Cleaning the chamber inside** – for cleaning the chamber use a wet and soft towel from cotton material. Special cleaning material or chemicals are not necessary. Do not use aggressive or organic chemical for cleaning! Chemicals can damage the sealing or sensors!

	**The rest of chemicals or cleaning materials will be brought forward to the sterilization goods of next sterilization cycle! Do not use aggressive or organic chemicals for cleaning!**

- Cleaning the accessories – Clean the baskets etc. with wet towel or under running water.

- Cleaning the housing – The housing needs to be cleaned by wet towel or light oil. Special cleaning chemicals like used in house hold can be used.

10.3. Check of safety valve(s)

The safety valve(s) needs to be checked once every six months. This should be done by specially trained service stuff. Other safety checks are necessary so we recommend that you perform a safety check together with the yearly maintenance check by a trained service engineer. While testing the function of the safety valve hot steam is leaving the safety valve.

The safety valve is checked by turning the knurled screw at the upper end of the safety valve until the valve opens. The valve is then closed again. To blow off the valve, there must be an overpressure in the chamber, so a program must be started. The test is carried out in the heating phase of the program, the program is then canceled. A special test program for starting the safety valve is available for authorized customer service technicians. Please ask the manufacturer who has been authorized in your area to properly maintain the device.

⚠	**Attention please! While steam is leaving the safety valve the valve is getting very hot in a very short time! Make sure that your skin is not coming in contact with the steam! Contact with the steam can burn your skin!**

⚠	**If the valve is not closing completely after testing it needs to be changed! If there are doubts about the regular functionality of the tested valve it needs to be changed!**

10.4. Changing the venting air filter / FA - Filter

The wear of the air filter is largely dependent on the quality of the ambient air. Particularly air contaminated with particles clogs the filter faster. Depending on the weather, this can fluctuate over the year. High humidity shortens the life of the air filter. We recommend changing the filter after 450 cycles in winter, after 300 cycles in summer or defining a regular cycle that corresponds to the individual frequency according to our proposal.

For devices without the S option, the filter is located at position 2 below the small cover. For devices with a corresponding option it is placed within the filter housing at position 1.

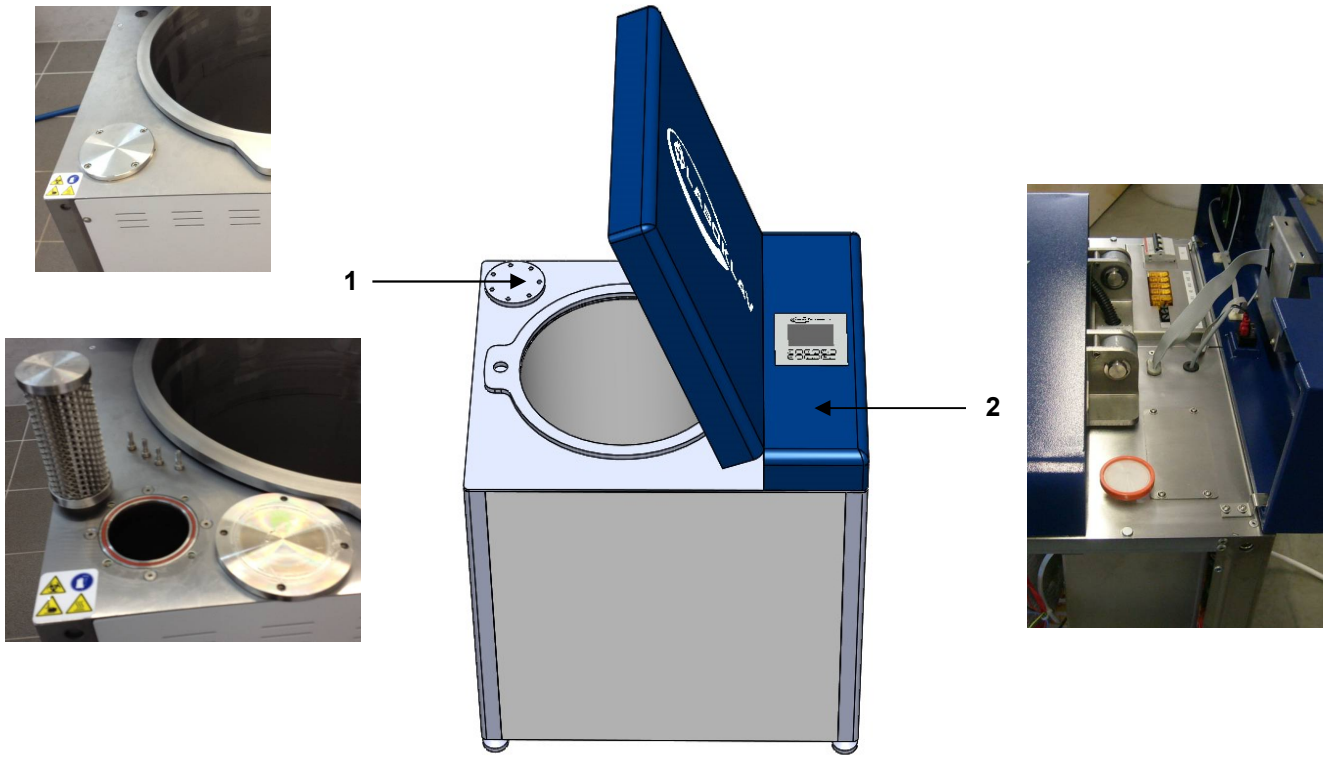


Figure: Laboklav free standing unit with filter

- The FA- Filter / sterile filter is located under the filter cover (1) on the front of the device below the chamber door. First open the chamber door to the right. Remove and replace the filter by prying it out.

- The venting air filter in position 2 can be removed by turning it anti-clockwise. The new filter is screwed in clockwise accordingly.

10.5. Changing the lid seal

It is recommended to check the door seal annually and replace it if necessary. The door seal should only be replaced properly by authorized personnel.
Improper handling / assembly can damage the seal and leakage or scalding as a result. In this case, contact customer service!

10.6. Changing paper and ribbon cassette of the printer

The CBM-920 CITIZEN printer is a dot-matrix printer. It is available as an optionally integrated device which is connected to the device via a serial interface RS 232.

For more information, please read the detailed operating instructions of the printer from the manufacturer.

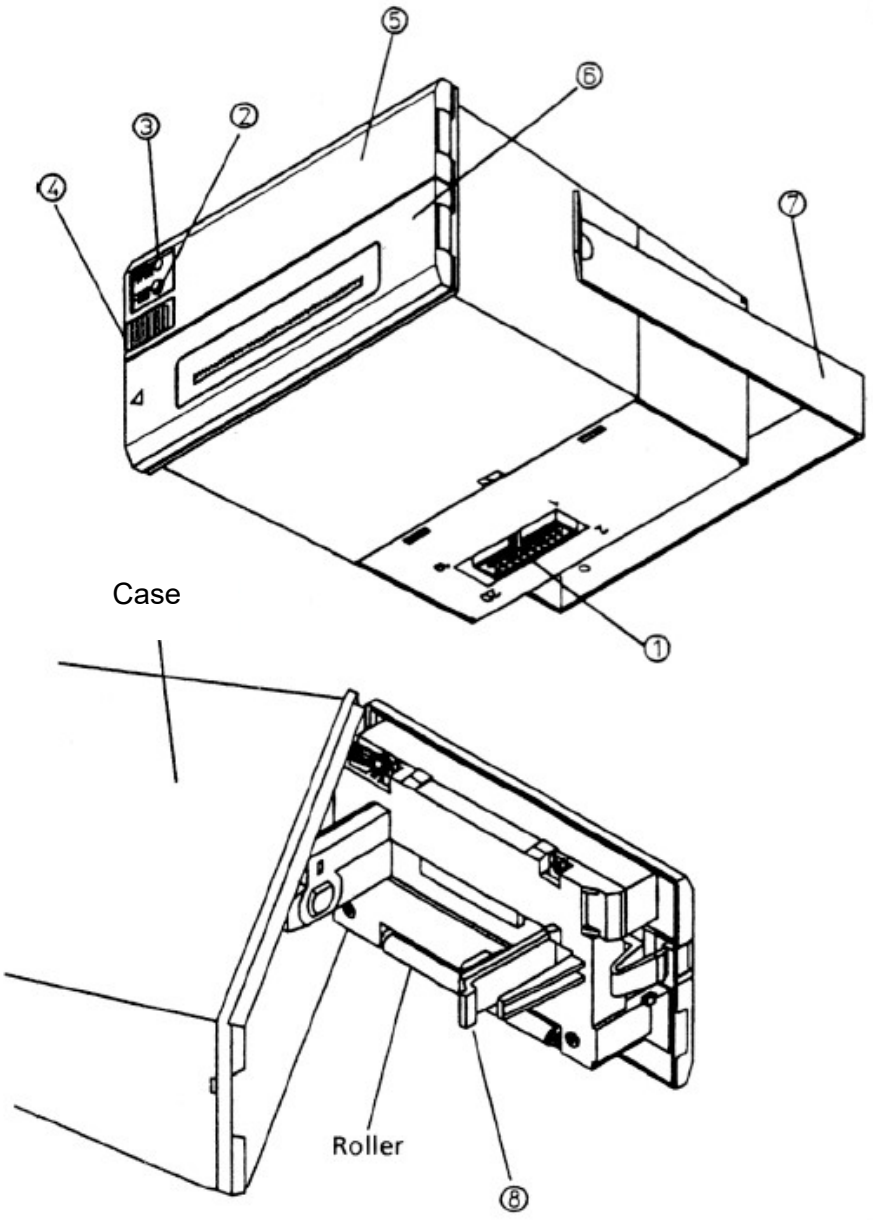


Figure: Printer CBM 920 RS 232

1- Interface Connector
2- Feed Switch
3- Paper Lamp
4- Knob
5- Front Cover
6- Ribbon Cover
7- Mounting bracket
8- Paper Holder

1.) Setting printing paper:

- Open the front cover of the printer.
- Cut the edge of Printing Paper as the following drawing:

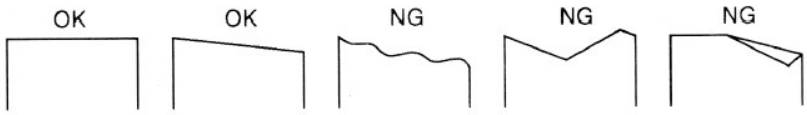


Figure: Cut the edge of the Printing Paper

- Insert the paper into the paper insertion of the printer mechanism. When auto loading function is specified, paper is loaded automatically. Otherwise push the LF switch until paper enters the printer mechanism.
- By holding the paper holder in the arrowed direction, insert paper roll and make sure paper holder hold the core.
- Eliminating slack on the printing paper, close the front panel.
- To change paper, as holding the paper holder in the arrowed direction, re-move the core. Remove, at this time, excessive paper by using the LF switch. After setting paper, press the LF switch once. Then, printer goes to data input printing mode.

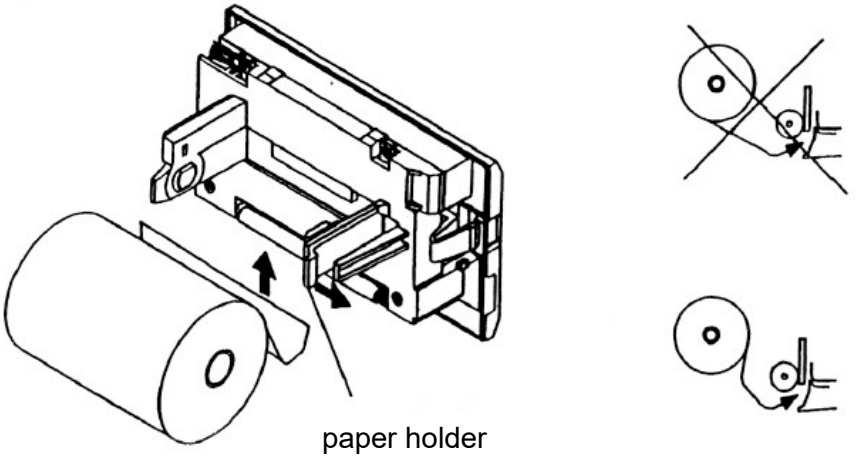


Figure: Setting Printing Paper

2.) Setting paper roll:

- Remove the empty roll by holding the paper holder to the side.
- Remove the empty roll core.
- Remove excess paper by pressing the feed switch.
- After loading the paper, press the feed switch again. This will put the printer in print mode

3.) Setting ribbon cassette:

- Press on the eject button. Cassette is ejected.
- A new ribbon cartridge can be inserted into the printer.

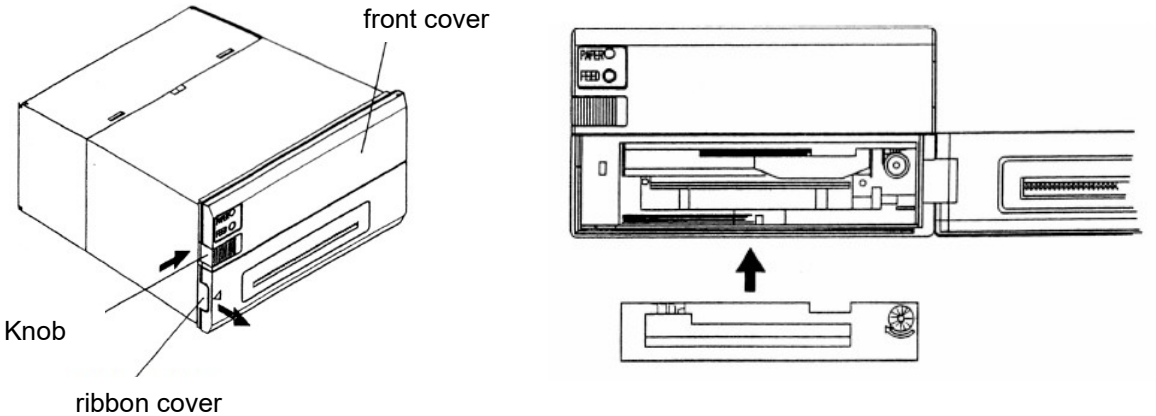


Figure: Setting ribbon cassette

10.7. List of consumables

spare part	drawing-number	article- number
Venting air filter; 0.3 μm / 99.5% – ϕ 50 (1/8" NPT)		40-0719-142-014
FA Filter		50.05.10015.012
Sterile Filter		40.05.10015.012
Printing paper		50.05.30001.199
Ribbon Cassette		50.05.30001.183
Door Seal ϕ 400 mm	Laboklav 55 – 100	50.05.10000.003
Door Seal ϕ 500 mm	Laboklav 135 – 195	50.05.10000.005

11. Description of safety devices

The steam sterilizer is equipped with different safety devices. The safety devices protect the user against injury and safe the sterilization process. Mechanical and electronic safety devices are built in and realize in sum a safety concept with different safety functions.

- **Protection against over pressure –** If control board is measuring a chamber pressure of more that 345 kPa absolute pressure (2,45 bar relative pressure) an alarm is generated (including error message) and the heating function is switched of. The heating function can be switched on manually again by pressing Escape button. So the program is not broken. With 360 kPa absolute pressure another error message is generated that is breaking the program automatically. With 2.8 bar relative pressure the safety valve is opening and chamber pressure is reduced mechanically! The steam is blowing into the housing contact with the steam is not very dangerous because it is saturated after blowing out.

  Attention: To check the safety valve a special program can be implemented that is bridging the safety functions of over pressure protection. This program will be implemented on special order by the customer only! Blowing off the safety valve in the condition that the housing I not opened can damage the electric board!

- **Protection against opening the chamber while over pressure is inside** – The device has a built in thermo locking function. The device opens the thermo lock when pressure is low only. The pressure is checked by pressure sensor and an additional pressure switch that detects normal pressure. The opening mechanism is calculated to open when chamber pressure is low. These 3 safety functions give good protection against opening while pressure in chamber is high.

- **Protection against opening the chamber while Temperature of liquids is too high** – One part of the thermo locking system is the measurement of the temperature inside liquids by the reference sensor. The device is unlocking the lid in liquid programs when temperature is lower than programmed removing temperature is reached only. The flask where the reference sensor is positioned should be from the same size, form and filled with same volume of the largest single volume of the sterilization goods.

- **Protection against steam out coming from chamber** – Steam production is switched off immediately if the lid is opened. After program finish the preheating of steam generator is switched off so steam out coming from steam inlet should be not possible. Preheating is switched on again after new program change or entering the same program again.

- **Protection against overheating the steam generator** – The steam generator is protected against overheating by 2 independent over temperature switches. One of them is self-resetting when temperature is low again, the second one needs to be reset manually by authorized service staff. Overheating protection switches break the program.

- **Protection against overheating the chamber** – The chamber is not directly heated so it can reach maximum the steam temperature that is limited by the pressure.

⚠	**The safety devices are to be carried out once a year by an authorized service technician, who is considered a qualified person.**

12. Additional information

12.1. Definition of feed water quality

Acc. to **EN 285** – “Steam sterilizers”, app. B / EN 13060 – small size steam sterilizers App. C

Ingredients in condensate and feed water

	Feed water	Condensate
Residual dry matter	≤ 10 mg/l	≤ 1.0 mg/kg
Silica oxide, SiO_2	≤ 1 mg/l	≤ 0.1 mg/kg
Iron	≤ 0.2 mg/l	≤ 0.1 mg/kg
Cadmium	≤ 0.005 mg/l	≤ 0.005 mg/kg
Lead	≤ 0.05 mg/l	≤ 0.05 mg/kg
Other heavy metals, except for iron, cadmium, lead	≤ 0.1 mg/l	≤ 0.1 mg/kg
Chlorines	≤ 2 mg/l	≤ 0.1 mg/kg
Phosphates	≤ 0.5 mg/l	≤ 0.1 mg/kg
Conductivity (at 20°C)	≤ 15 µS/cm	≤ 3 µS/cm
pH	5 to 7	5 to 7
Colour	Colourless, clean, no deposit	Colourless, clean, no deposit
Hardness	≤ 0.02 mmol/l	≤ 0.02 mmol/l
NOTE 1: Using water of contamination greater than specified above for steam generation, can considerably reduce the sterilizer life. **In this case the warranty is void.** NOTE 2: The condensate should be derived out of the steam collected during sterilizing cycle with the chamber empty.		

Tests for conformance are performed with commonly used analytic methods.

12.2. Disposal

By labeling a device with this symbol, SHP Steriltechnik AG declares that it complies with all requirements arising from the Act concerning the Placing on the Market, Return and the Environmentally Disposal of Electrical and Electronic Equipment. (WEEE Reg. No.: DE43170688)
The device must not be disposed of as household waste or industrial waste due to contaminated parts. Please contact the SHP Steriltechnik AG, so that the final destination of the device can be decided.

You can find documents (form "return of electronic devices") for the take-back of used devices and the proof of decontamination in the enclosed device folder. These can also be obtained from the homepage of SHP Steriltechnik AG.

12.3. Meaning of the program types (abbreviations)

Only for solid programs:

There are no differences between the programs within the phases - heating-up phase / sterilization phase, the differences lie in the ventilation and drying phase. A pre-vacuum or fractionated pre-vacuum and possible drying function are only possible in an equipment variant with "V" for vacuum.

Instruments / destruction **ST**= Solids program for solid items to be sterilized that are easy (very easy) to deaerate (solid items without cavities that are difficult to deaerate, e.g. laboratory equipment), deaeration of the sterilization chamber using a pressure purge process, no drying option possible

Instruments / destruction **FV**= Solids program for hard-to-deaerate, solid items to be sterilized (solid objects, including those with cavities that are difficult to deaerate), deaeration of the sterilization chamber by means of a fractionated pre-vacuum, a drying option is possible

For liquid programs only:

There are no differences between the programs within the phases - deaeration phase / heating-up phase / sterilization phase, the differences lie in the cooling phase. An exception to this is the "RG" program type, which is not, like the others, a saturated steam process, but a special program with a steam-air mixture process.

Liquid / destruction liquid **SL**= Very slow cooling (self-cooling) for open vessels with liquids (no steam-outlet, without active jacket water cooling and without compressed air in cooling phase) /very slow cooling variant within liquid programmes /with normal liquid loss

Liquids / destruction liquid **ST**= standard cooling for open vessels with liquids (clock rated steam outlet, without active jacket water cooling and without compressed air in cooling phase) / slow cooling variant within liquid programs / with normal liquid loss

Liquids / destruction liquid **RM**= cooling with jacket water cooling for open vessels with liquids (clock rated steam outlet, with active jacket water cooling and without compressed air in cooling phase) / very fast cooling variant within liquid programs / with very high loss of liquid (sterilization chamber quickly goes into a vacuum during the cooling phase).

Liquids / destruction liquid **RO**= cooling with jacket water cooling and compressed air for open vessels with liquids (clock rated steam outlet, with active jacket water cooling and compressed air in cooling phase) / fast cooling variant within liquid programs / with very low loss of liquid (sterilization chamber received compressed air during the entire cooling phase)

Liquids **RG**= special program (steam-air mixture process), should only be used if no other solution is available / great attention to the loading variant, recommendation of program validation for a specific loading. Cooling with jacket water cooling and compressed air (also during the heating and sterilization phase) for tightly closed vessels with liquids (clock rated steam outlet, with active jacket water cooling and with compressed air) / fast cooling variant within liquid programs / no loss of liquid within closed vessels (sterilization chamber get compressed air during the completely cycle - excluding preheating and deaeration)

The various program types are available depending on the device configuration. All program types are available in the "MSLV" equipment configuration.

Validation of the specific loads is recommended for maximum process reliability.

13. Service and maintenance

If there are any problems in operating the sterilizer please contact your distributer first. The distributer knows the address of the next authorized Service Company or is able to solve your problem directly

Manufacturer Germany	SHP Steriltechnik AG, Schloss Detzel 1, 39345 Detzel Schloss/ Satuelle	
Fax	+49 391 6269881	08:00 to 17:00 Mo. – Fr.
Phone	+49 391 6269880	08:00 to 17:00 Mo. – Fr.
Mobile	+49 177 6269880	24 h
Email	info@shp-steriltechnik.de	08:00 to 17:00 Mo. – Fr.

You can also contact the local importer/distributor as per your invoice or the mentioned on the sticker on the instrument.