

Description of the offered unit Laboklav 135 MSLV

The offered unit is:

- equipped for the sterilisation of liquids, solids and waste
- compact and space saving
- can be installed as vertical or horizontal autoclave
- is available in different colour combinations

All units of the series Laboklav are easy to operate and are very low in consumption of energy and water. Already the basic version incorporates all features to make it a modern and ready to use laboratory autoclave.

The universal installation concept

- Space requirements 840 x 965 x 700 mm (vertical installation)
- Space requirements 840 x 870 mm (horizontal installation)
- Lid opening side is variable (vertical installation only)

The series Laboklav has been designed to be very compact and space saving. All components are placed inside the housing. Additionally the unit offers various possibilities of installation. The lid can be opened to the right or to the left; the unit can be operated and loaded from the small side. It can be installed as a horizontal or vertical autoclave - all without additional costs or any alterations. The compact design results in a lower loading height making it easier to fill the autoclave with baskets and bottles.

Colour variants

- Blue/light grey
- Red/light grey
- Green/light grey

No extra charges apply for ordering Laboklav in different colour variations. All side panels of the housing are coloured light grey in powder coating; the visible part of the basic frame is in brushed stainless steel. Coloured applications in the lid and the control panel complement the fresh and modern design.

Integrated steam generator as standard

- Heating power 10 kW

The autoclaves of the Laboklav 55 - 195 series have an integrated and performance-optimised steam generator, which ensures shortened batch times due to very fast heating times of the autoclave chamber as well as the loading.

Automatic level monitoring and dry-running protection are integrated into the steam generator, which is mounted separately from the chamber. At the same time, exactly the amount of energy needed to heat up the sterilisation chamber and load is provided. The amount of energy and thus the chamber temperature is controlled by high-quality PID control algorithms that have been implemented directly in the software of the highly modern and particularly powerful microprocessor technology. This makes it possible to run equally high-quality control processes as are common in the most modern large sterilisers today, without having to accept the extremely high costs at the same time.

Cost saving and environmental friendly

- High loading volume
- Less energy costs

The conclusion that a bigger chamber automatically means a higher loading capacity is commonly accepted but not true in all aspects, especially when loading 1l laboratory bottles. Thus making the unit as compact as possible does not only save the costs of expensive stainless steel but also dramatically reduces the heating requirements without extending the heating up time. Consequently during the cooling phase less energy has to be transported out of the system. Laboklav is equipped with much less heating energy than comparable chamber sizes, optimized for laboratory processes. The reduction in heating power results in much lower energy costs and, as a consequence, running costs of the unit are reduced.

Protection against limescale

A low quality of the required demineralised water can cause severe damages on the device. A permanent monitoring of the conductivity value in all supply lines to the steam generator and to the double jacket of chamber helps here to avoid damages. In the event of a too high conductivity value a message is shown in the display.

Protection system for drain pipes

- Exhaust steam condenser included
- Condensate temperature adjustable

The protection of the laboratory drain pipes from hot steam is included in all Laboklav devices. The discharge system of Laboklav connects steam, condensate and water outlet into one exit pipe. The temperature of this exit is controlled by means of a PT 100 sensor according to the set values in the control cold tap water is added to reach the set temperature and by this avoiding damage to the drain pipe by steam or hot condensate. By using a PT 100 temperature sensor and the possibility to adjust the condensate and steam drain temperature the unit can be adjusted to the type of pipes and the temperature stability of the pipes used in the laboratory. As a result only the amount of cold water is added to suit the purpose and no water is wasted. This is a further technical feature to save costs and resources.

The secure closing system with thermo locking device

- Fully automatic, motorized closing system
- Thermo locking device to avoid boiling retardation
- Heat insulated opening support handles

All units of the series Laboklav are equipped with a secure and easy to operate closing system. After loading the lid is slightly pressed down by the operator. By pressing the relevant key on the control panel the lid is automatically closed by the drive motor. The lid seal, a T profile silicone seal, is keeping the system closed both under pressure and in vacuum. Various safety chains make sure that the lid is not opened under pressure or at high temperature (thermo locking device). This system is save against manipulation and power cuts. When activating a liquid programme the reference temperature is monitored by a flexible PT 100 sensor, also this is included into the basic model. The sensor is starting the sterilisation time counter and controls the opening temperature after cooling down the liquid. The automatic opening of the lid can only be activated when the reference temperature has reached the set value which is minimum 4 K below boiling point of the liquid. The lid will swing open after the motor is releasing the locking spindle in two steps. Step one is opening half way to allow remaining steam leaving the chamber, in step two the lid is fully opened. The complete system does not require any compressed air nor is it using pneumatic components.

Fast re-cooling without wasting water, type MSL

- Full double jacket cooling
- For open and lightly closed vessels as well as pressure tight closed vessels
- No waste of cooling water due to integrated storage system and recirculation

The unit is equipped with a high efficient recooling system to dramatically reduce cooling down times when sterilizing liquids. The double jacket is floated with cold demineralised water and by circulating the water around the chamber the energy is transported out of the system. As a result the cooling down time can be reduced up to 50% depending on loading volume and vessel size. The main advantage is the full double jacket. Different from a cooling coil around the chamber, the double jacket ensures the contact of cooling liquid onto the full surface of the chamber and a fast transport of heat energy.

The integrated counter pressure option, where sterile filtered compressed air is fed into the chamber, ensures that no loss of liquid appears and that pressure tight vessels will not burst. The chamber is kept at higher pressure than the pressure inside the vessels to be cooled down. An into the lid integrated fan avoids temperature layers inside the chamber due to limited natural convection of steam and air and enhances the cooling capacity. An external connection to compressed air is required.

The cooling system is being fed from the storage tank of demineralised water. After circulation around the double jacket the water is being pumped back into the tank. Integrated into the tank is a heat exchanger, mainly using the water required for the exhaust steam condenser, to cool down the water inside the tank. Additionally cold tap water can be used for heat exchange purposes, the values can be set in the relevant programmes.

Up to now autoclaves with integrated water cooling usually consume approx. 50l of demineralised water for cooling purposes per batch. This water is sent to the drain and wasted. The Laboklav system offers real cost savings and saves our limited natural resources.

The complete vacuum system

- Single and fractionated pre-vacuum
- Drying vacuum
- Additional heating during vacuum drying is integrated

When sterilizing hollow items and mixed waste fractions a complete de-aeration of the chamber is usually difficult to achieve. But the principles of steam sterilisation require saturated steam conditions meaning the part of not condensable gases (e.g. air) should not be more than 2%. A vacuum system is required.

Integrated into the compact housing of the unit is a high performance water-ring vacuum pump. The capacity of the pump is suitable to evacuate the chamber and the sterilisations goods fast and reliable. Depending on the sterilisation goods programmes with single pre-vacuum or fractionated pre-vacuum can be selected. The number of fractions, same as the vacuum values can be set in the relevant programmes.

A drying vacuum is useful when sterilizing pipette tips, glassware, filter and textiles since no drying in a drying oven is required after sterilisation. For drying purposes it is required to additionally heat the chamber during this process. During the drying vacuum the chamber is heated with steam pulsing through the double jacket. This function is always included into the vacuum option.

For the vacuum option it is required to connect the unit to a tap water supply.

Media connection

- Integrated tank for feed water and cooling water
- Manual or automatic filling of feed water is possible
- Connection to drain pipe

The autoclave can be connected to the existing media supply in the laboratory. To make the unit operable a connection to demineralised and cold tap water is required, same as a connection to the drain pipe. Please see technical datasheet for further details. In case the connections are not available the unit can be operated without fixed connection. The steam generator is being fed from the integrated storage tank which can be filled manually. If connected the unit recognizes the installation conditions automatically and activates automatic filling of the tank. The exhaust drain can be connected to a suitable canister.

One controller for all types

- Foil key pad with clear and easy to understand symbols
- Large LCD Display
- Process data are displayed during program run
- Up to 20 pre-configured programs
- Code protected access level to programs
- Programs can be individualized

A clear, easy to read and understand foil key pad eliminates operation errors and increases safety. Clear symbols guide through the menu, programs can be opened fast. The structured big LCD display informs permanently during a program cycle of all relevant process and program parameters. In case of an error a message is displayed and informs the operator.

Depending on the integrated options the 20 programs are optimized for the machine configuration. Additionally vacuum units are equipped with the Bowie & Dick and the Vacuum Test Program. It is possible to change program places in the control and to give programs individual names.

Data storage and recording made simple

- RS 485 integrated
- 4 MB storage chip for storing process data integrated

The autoclaves can be equipped with different cycle recording systems. Data can be printed out with the integrated built-in printer (optional) or can be transferred to a PC via the integrated interface (optional software required). Already the basic version of Laboklav has an integrated storage chip with 4 MB storage capacity. The cycle data is automatically stored and can be printed out or transferred to a PC at a later stage. A Minimum of 100 cycles are stored, more is possible but depends on the data volume per cycle.

Norms and installation

- Manufactured in Germany in accordance with the relevant norms and regulations
- Design and serial production approved by the German TUV
- CE marked in accordance with Pressure Equipment Directive
- Installation by trained personal only

The Laboklav series is manufactured in Germany in accordance with the relevant norms, production norms and regulations applying to Laboratory autoclaves and pressure vessels. They have been marked CE or CE 0036 in accordance with the Pressure Equipment Directive 2014/68/EU, category B+C2 approved.

Installation and putting into operation at the customer's site is made by trained and skilled personal only. All service engineers attend regularly a comprehensive training in the training facilities of SHP Steriltechnik AG.

Technical data 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 (net).....	app. 205 kg
Volume feed water tank.....	app. 40 l
Maximum load:	
- Instruments	40 kg
- Textiles	25 kg
- Liquids	30 l total volume
Sterilizer chamber:	
Total volume	app. 135 l
Chamber dimension (ϕ x D)	ϕ 500 x 660 (+50-round.) mm
Usable volume	app. 130 l
Maximum allowable pressure (PS)	2.8 bar
Maximum allowable temperature (TS)	138°C
Working pressure safety valve	2.8 bar
Material number for chamber and double jacket.....	1.4404 (SS 316 L)
Surface roughness.....	$\leq 0,8 \mu\text{m}$
Pressure Device Directive 2014/68/EU.....	CE0036, cat. II, module B+C2
Power supply:	
Voltage	3N 400V~ ($\pm 5\%$), 50 Hz, 16A
Working power.....	10 kW
Averaged power consumption per cycle	15 kWh
Protection class	I
Protection level.	IP24
Water supply:	
Distilled or demineralised water (acc. to annex C EN 13060:2004)	
Averaged feed water consumption per cycle.....	app. 5,5 l to 15 l
Storing conditions:	
Temperature	5 ÷ 40°C
Humidity	max. 85%

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 programs in user level 2:

Program P11 to P20

Code protected, pre-defined like P1

2 test programs (P 11: Bowie & Dick-Test, P12: vacuum test, in vacuum devices only)

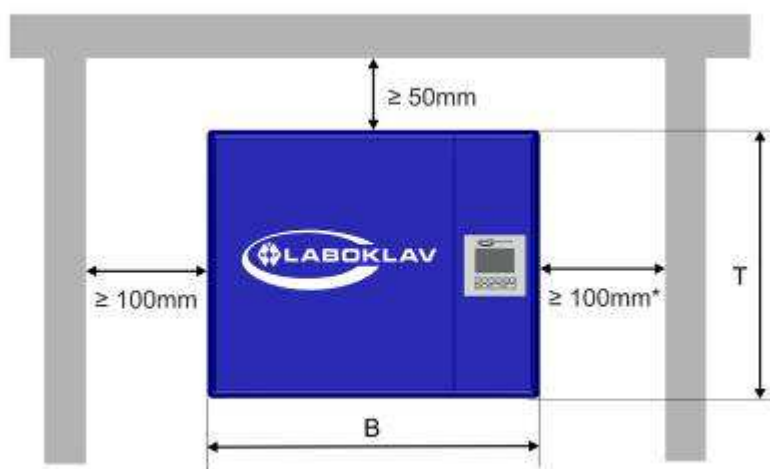
Computer interface:

- serial interface RS 485

Possible options

- Touchscreen display with USB and network connection
- Documentation software SegoSoft
- Exhaust air filtration
- Side covers in stainless steel

Installation dimensions for vertical devices (top view)



All dimensions are minimum dimensions and should not be reduced to safe the heating power emission without problems.

	Width	Depth	H	H1
Laboklav 55	740 mm	600 mm	765 mm	1385 mm
Laboklav 80	740 mm	600 mm	915 mm	1535 mm
Laboklav 100	740 mm	600 mm	1065 mm	1685 mm
Laboklav 135	840 mm	700 mm	965 mm	1685 mm
Laboklav 160	840 mm	700 mm	1065 mm	1785 mm
Laboklav 195	840 mm	700 mm	1215 mm	1935 mm

H - Height of device with closed lid

H1 - Height of device with open lid

Remarks for installation as horizontal device:

Please leave at least 100 mm space on both sides and to the back.

An optional stand is highly recommended.

* If using an external condensate tank, in the case that there is no connection to drainage possible, this dimension is additionally necessary.

Product characteristics Laboklav 55 – 195

Product characteristics	Special features
Sterilizer chamber	Directly steam heated by integrated seam generator, indirectly steam heated by heating jacket while preheating and drying
Lid and locking mechanism	Hinged lid with motorized locking mechanism, safety lock
Lid seal	T-profile seal, silicone
Temperature measurement	Independent temperature sensors PT100 T _{0,9} = 3 s, 2-wire connection, internal resolution 0,01K, display resolution 0,1K can be calibrated Continuous monitoring of break and short cut
Reference sensor for liquids	Sensor like in temperature measurement defined but with flexible connecting cable
Calibration certificate acc. to ISO	Option
Pressure measurement	Electronic pressure sensor 0 to 6 bar, absolute pressure or relative pressure, programmable, resolution and display 0.1 kPa, continuous monitoring of sensor break
Calibration certificate acc. to ISO	Option
Feed water supply	Internal feed water tank with integrated degassing of feed water, automatic fill and refill, hand filling possible while lid is open
Feed water pump	35 l/h, automatic supply from feed water tank
Feed water level regulation	Level sensors for low and max. level
Over temperature protection for heaters	2 independent systems: temperature control of heaters by PT 100, 2 over temperature protection switches for 220°C and 250°C, 1x with auto reset, 1x reset by service only
Vacuum pump (option)	Water ring vacuum pump Housing from brass, compression wheel from bronze Single phase electro motor, no 3 phase system necessary!
Single and fractionated pre-vacuum	Parameter programmable (option)
Sterile venting system	Membrane filter, $\mu \leq 0,2 \mu\text{m}$, in all models
Display for filter change	Yes

Display for maintenance cycle	Automatic message generation if maintenance is needed
Validation duct	1 Vacuum test (PT) G1/2" 1 Temperature test (TT) G1"
Microprocessor control	Control of all functions, messaging by graphic display
Safety line	For heaters and chamber pressure
Timer	Program start depending of date and time programmable
Acoustic signal	Can be switched off
Interfaces	Internal RS232 for printer External RS485 for printer, network, computer connection
Batch printer (option)	Needle printer, 50 mm writing width, normal paper role
Fast cooling (option)	Circulation system with energy recovery, energy remove by tap water

Consumption data Laboklav 55 – 195

Feed water consumption per batch	App. 0,7 to 8,5l demineralised water
Cooling water consumption for condensate cooling	App. 5 to 12l tap water
Energy consumption per batch	App. 1,8 to 7,5 kWh
Heat emission into the room	App. 0,5 to 1,9 kWh
Power safe function	Heat recovery and degassing when cooling
Cooling water consumption for vacuum pump	App. 2l/min when pump is running (averaged app. 20 to 40l per batch)
Cooling water for fast cooling option	No demineralised water (feed water is running circular) The additional tap water depends on the load and removing temperature