

DATASHEET FOR PLUSTEAM SERIES STEAM STERILIZERS

PLUSTEAM series steam sterilizers are used to sterilize all materials which may be sterilized with pressurized saturated steam. All sterilizers are equipped with software, electricity, and mechanical safety in case of problems. Automatic process flow with ability to manual running for service ensures sterilization safety as per EN 285 norms.

APPLICATION

PLUSTEAM series steam sterilizers are used in general-purpose steam sterilization in hospitals for surgical instruments, textiles, and hospital utensils. PLUSTEAM series can also work for laboratory sterilization and waste disposal purposes with special adapted programs for waste materials or various types of liquid cycles and general-purpose steam sterilized items in laboratories when necessary optional features added.

OVERALL

Device is designed to have minimum complex panel system with a single piece main panel and a service access door on front to reduce the risk of infection. Manual controls other than on/off switch (for loading side only) and emergency stop button (on each side for pass-through models) are omitted from front panel design. Water saving design enables savings up to 80% compared to a classical steam sterilizer. Manometers (pressure gauges) are located inside sterilizer for service purposes showing jacket, gasket, chamber, and generator pressures. It is optional to have manometers on panels upon request. Device has mobility with 4 castors of \varnothing 80 mm. Firm fixing is done with suspension legs, which also enables levelling in non-flat surfaces.

QUALITY AND CERTIFICATION

PLUSTEAM series steam sterilizers are manufactured according to Medical Devices Directive 93/42/EEC as amended by directive 2007/47/EC. Steam sterilizers are Class IIB device according to MDD 93/42/EEC 2007/47/EC (Annex IX). Electrical tests according to 2014/30/EU (harmonized standards EN 60601-1-2 & EN 61326-1 – EMC) and 2014/35/EU (harmonized standard EN 60601-1, EN 61010-1, EN 61010-2-040 – LVD). Software complies with EN 62304 (Medical Device Software Cycle Process). Pressure vessels inside device are according to Pressure Equipment Directive 2014/68/EU (Modules B, D & D1, harmonized standards EN 13445-1, EN 13445-2, EN 13445-3, EN 13445-4, EN 13445-5, EN 14222). PLUSTEAM steam sterilizers are manufactured according to device standard EN 285 and as per installation validation EN ISO 17665-1. Sterilizers are compatible with Machinery Directive 2006/42/EC. Labelling and symbols used are as per EN 15223-1 while usability is assured through EN 62366 & EN 60601-1-6. All processes across TBT are certified according to Quality Management System EN ISO 9001:2008, Environmental Management System EN ISO 14001:2015, Occupational Health and Safety System EN ISO 45001:2018 and Quality Management System for Medical Devices EN ISO 13485:2016.



DIMENSIONS & CAPACITY

Model	Ref. No.	Loading Height (mm.)	Device Dimensions (mm.)			Chamber Dimensions (mm.)			Capacity	
			W	D	H	W	D	H	L	STU
PLUSTEAM 1S	511001	820 + 45	885	1107	1650	390	670	390	102	1
	511023									
	511027									
	511012									
PLUSTEAM 1M	511025	820 + 45	885	1113	1650	390	790	390	120	1
	511038									
	511002									
	511024									
PLUSTEAM 1L	511028	820 + 45	885	1373	1650	390	1050	390	160	1,5
	511013									
	511026									
	511039									
PLUSTEAM 1XL	511003	930 + 45	995	1163	1750	500	840	500	210	1,5
	511049									
	511029									
	511014									
PLUSTEAM 2	511050	930 + 45	995	1163	1750	500	840	500	210	1,5
	511040									
	511004									
	511030									
PLUSTEAM 4	511015	930 + 45	995	1323	1750	500	1000	500	250	1,5
	511041									
	511005									
	511031									
PLUSTEAM 6	511016	930 + 45	995	1623	1750	500	1300	500	325	2
	511042									
	511006									
	511032									
PLUSTEAM 8	511017	930 + 45	1165	1163	1950	670	840	670	377	4
	511043									
	511007									
	511033									
PLUSTEAM 10	511018	930 + 45	1165	1323	1950	670	1003	670	450	6
	511044									
	511008									
	511034									
PLUSTEAM 12	511019	930 + 45	1165	1623	1950	670	1300	670	584	8
	511045									
	511009									
	511035									
PLUSTEAM 14	511020	930 + 45	1165	1923	1950	670	1600	670	718	10
	511046									
	511010									
	511036									
PLUSTEAM 14	511021	930 + 45	1165	2223	1950	670	1900	670	853	12
	511047									
	511011									
	511037									
PLUSTEAM 14	511022	930 + 45	1165	2523	1950	670	2200	670	988	14
	511048									

Model	Ref. No.	Door(s)		Generator Dimensions (mm.)		Generator Power (KW)	Generator Capacity (L)
		Type	No.	Ø	L		
PLUSTEAM 1S	511001	M					
	511023	A	1	252	480	20	24
	511027	H					
	511012	M					
	511025	A	2	252	480	20	24
	511038	H					
PLUSTEAM 1M	511002	M					
	511024	A	1	252	480	20	24
	511028	H					
	511013	M					
	511026	A	2	252	480	20	24
	511039	H					
PLUSTEAM 1L	511003	A					
	511049	M	1	325	480	30	40
	511029	H					
	511014	A					
	511050	M	2	325	480	30	40
	511040	H					
PLUSTEAM 1XL	511004	A	1	325	580	30	50
	511030	H					
	511015	A	2	325	580	30	50
	511041	H					
PLUSTEAM 2	511005	A	1	325	580	30	50
	511031	H					
	511016	A	2	325	580	30	50
	511042	H					
PLUSTEAM 4	511006	A	1	402	480	40	60
	511032	H					
	511017	A	2	402	480	40	60
	511043	H					
PLUSTEAM 6	511007	A	1	402	580	40	75
	511033	H					
	511018	A	2	402	580	40	75
	511044	H					
PLUSTEAM 8	511008	A	1	402	580	40	75
	511034	H					
	511019	A	2	402	580	40	75
	511045	H					
PLUSTEAM 10	511009	A	1	456	680	60	110
	511035	H					
	511020	A	2	456	680	60	110
	511046	H					
PLUSTEAM 12	511010	A	1	456	680	60	110
	511036	H					
	511021	A	2	456	680	60	110
	511047	H					
PLUSTEAM 14	511011	A	1	456	680	60	110
	511037	H					
	511022	A	2	456	680	60	110
	511048	H					

M - Manual Vertical Sliding
A - Automatic Vertical Sliding
H - Hinged

SERVICE

Sterilizers are served from loading side (& unloading side for pass-through models) and must have min. 600 mm space on side as well. Single door models do not need any additional service area at rear of device. It is possible to service sterilizer without any special tools and no tools are needed for replacing gasket(s), adjusting door sensors, auto-calibrating the pressure sensors to various altitudes or auto-calibrating temperature sensors. Service staff is protected from scalding injuries through protective insulation on pipes where applicable.

Service Access	Right Side	●	-
	Left Side	○	512078
		● Standard	○ Optional

Service ease is taken in consideration by offering various tools for use. A real time P & I diagram showing hot, cold and drain lines on colour coding basis, with all mechanical elements with their activation status, such as pumps, resistances and valves and sensor values. Once it is needed, it is possible to monitor every sensor value & status, at any time, including during a running cycle, on same panel. It is possible to activate and deactivate each component from touchscreen for diagnostic purposes or to replace gasket(s) as well. A separate menu for service enables monitoring of real time values and status of all components on section basis to support diagnostic process

PANEL & ELECTRICAL SUPPLY

All electrical control and operating elements are placed inside an electrostatic painted panel box with labelling for easy recognition and safety on side. It is possible to select your electrical connections when necessary depending on city supply.

City Supply	380 VAC, 50 Hz, 3P + N + G	●	-
	380 VAC, 60 Hz, 3P + N + G	○	512043
	220 VAC, 50 Hz, 3P + N + G	○	512044
	220 VAC, 60 Hz, 3P + N + G	○	512045
	208 VAC, 50 Hz, 3P + N + G	○	512057
	208 VAC, 60 Hz, 3P + N + G	○	512058
	460 VAC, 50 Hz, 3P + N + G	○	512060
	460 VAC, 60 Hz, 3P + N + G	○	512059
	W/O Neutral Line	○	512061
			● Standard



LANGUAGES & DOCUMENTATION

PLUSTEAM series have several options for language preferences:

	Display	Printer	Documentation		
Language	English	●	●	●	
	German	●	●	●	
	Turkish	●	●	●	
	French	●	●	○	
	Italian	●	●	○	
	Spanish	●	●	○	
	Russian	●	●	○	
	Polish	●	●	○	
	Romanian	●	●	○	
	Portuguese	●	●	○	
	Bahasa (MLY)	●	●	○	
	Bahasa (IND)	●	●	○	
	Swedish	○	○	○	<i>Ask for details!</i>
	Other ^a	○	○	○	512006

● Standard ○ Optional

^a Translations to be made on request.

CONSTRUCTION

To extend the lifespan of device to maximum only high-quality stainless steel is used all over sterilizer. Areas with heat contact are insulated with 50 - 100 mm to prevent heat loss. CFC free glass wool with aluminium tape exterior for better isolation. Chamber & Jacket and generator are made of AISI 316 L quality stainless steel and covered with AISI 304 stainless steel plate for a clear view over insulation material. To provide robustness, door is made of a combination of AISI 304 and AISI 316 L steel. Side panels are made of AISI 304 stainless steel, equipped with handgrips with lock for fast and easy service. Stainless steel screws with no external ends are used to prevent injuries on top side of panel holders. Loading and unloading sides are made of AISI 304 stainless steel in a single pieced design and an additional service panel opening is present. Backside of the device is covered with a panel made of AISI 304 stainless steel in single door configurations. Frame is completely made of AISI 304 stainless steel. A bottom dripping plate made of AISI 304 is placed to base the components.



The sterilizer chamber is in rectangular shape. STU & ISO compatible design is used in according for easy procedures in CSSD and TSSU (RUMED – Reprocessing Unit for Medical Devices). Chamber and jacket are mounted on an AISI 304 stainless steel section of the main frame. Internal surfaces of chamber are robotic polished ($\sim 0,1$ Ra) to offer a clean, durable, and good-looking surface. Chamber is provided with 1" validation port according to EN 285.

Jacket is formed around chamber in continuous "O" shaped forms. These forms increase stability of temperature distribution while also providing a support for chamber in vacuum and pressurized conditions. Jacket covers 4 sides (5 sides of device in single door models).

Door(s) is powered by a pneumatic piston in automatic sliding door versions, which allows adjustment of door speed and power. Door operations can be controlled from touch screen. It is also possible to have manual control buttons on panel to control door movements. Additional supports are placed inside door system for increased durability. Door(s) are moving inside a pathway placed on sides of a single piece gasket channel manufactured completely with machinery and without any welding. Single piece design increases stability and enables life-long use while non-welding design eliminates risk of leaks in steam sterilizer. Single piece design also prevents mechanical damages which gaskets may bear while being replaced in maintenance or being operated in standard cycles of operations.

Gasket is silicone in "O" shape. Connection point of gasket is marked with a stripe to provide ease in service and maintenance. It is possible to have maintenance free gasket as an option. Gasket is pressed from single piece gasket channel with pressurized air to extend life span, after closing door(s) at the beginning of cycle and retracted by vacuum before opening door(s) at the end of the cycle.

All pipes and fittings are made of AISI 304 stainless steel and heat insulated. Insulation material on pipes has a low leachable chloride content (< 30 ppm) to minimise stress corrosion cracking and with built-in water vapour barrier reduces risk of corrosion under insulation. Piping system has been coded in 4 colours for service ease. (Blue = Cold, Red = Hot, Green = RO, Gray = Drain) All hoses in touch with heat are made of Teflon® and PU for cold air supply lines.



INSTRUMENTATION

An integrated two staged, silent, liquid ring vacuum pump without valves and 33 mbar minimum inlet pressure for water saving purposes, placed on vibration isolators. Vacuum pump removes air from chamber during necessary parts of a cycle. Water connection of the vacuum pump is separated from feeder pump due to different water quality requirements hence device has 2 water inlets which can also be connected at a single port on-site if necessary.

Model	Power ^a		Flow Rate (m ³ /h) ^a	Vacuum Power at 100 mbar (m ³ /h) ^a
	KW	HP		
PLUSTEAM 1S	1.5	2.0	34	31
PLUSTEAM 1M	1.5	2.0	34	31
PLUSTEAM 1L	2.2	3.0	59	55
PLUSTEAM 1XL	2.2	3.0	59	55
PLUSTEAM 2	2.2	3.0	59	55
PLUSTEAM 4	2.2	3.0	59	55
PLUSTEAM 6	2.2	3.0	59	55
PLUSTEAM 8	2.2	3.0	59	55
PLUSTEAM 10	2.2	3.0	59	55
PLUSTEAM 12	4.0	5.4	128	124
PLUSTEAM 14	4.0	5.4	128	124

^a Data given are for 60 cycles frequency.



Water supply to the steam generator is done by a feeder pump with a mechanical seal and power of 0,35 KW. The temperature range allows it to work in temperatures up to 140°C.

A H14 class cartridge HEPA filter, with a heat-sealed construction eliminating adhesive and resins, is used to filter air entering the chamber for equalizing pressure. It is a sterilizable type special autoclave grade filter equipped with a hydrophobic PTFE membrane which will remove all particles down to 0.01 micron, thus removing airborne bacteria, viruses, and bacteriophage. Air used to run valves and door mechanism is directed by regulators in which one has a filter system. A separate fine mesh filter located inside chamber prevents linen and other particles to damage the pump and components.

Pneumatic valves, which require less maintenance and longer service life, are used in PLUSTEAM series. All valves used are made of AISI 304 stainless steel. To increase service life, check valves from AISI 316 stainless steel which can operate on temperatures up to 200°C, are adapted to system. Additional safety system provides a barrier between valves and critical parts like vacuum & water pump, hence extending lifetime.

	AISI 304	●	-
Pneumatic Valves	AISI 316 L (Including Steam Piping)	○	512032
	AISI 316 L	○	512048

● Standard ○ Optional

Safety valves used in sterilizer are certified, as per Pressure Equipment Directive, with serial numbers and separate declarations for maximum traceability. They can operate up to 250°C. The set pressure for the safety valves in chamber and jacket are 2.9 bar with discharge on atmosphere of 147 kg/h and generator is 4.0 bar with discharge on atmosphere of 192 kg/h.

Safety Valves	Fixed Type	●	-
	Fixed Angular Type	○	512064
		● Standard	○ Optional

Safety valves used in sterilizer are certified, as per Pressure Equipment Directive. Stainless steel inner mechanism with easy to replace inner mechanism for reducing maintenance costs and chrome plated exterior body made them able to withstand temperatures up to 250°C and pressure levels up to 16 bar.

STEAM SUPPLY

In standard configurations, an automatic, integrated steam generator with optimal capacity and electrical heating power which depends on the chamber capacity is mounted below chamber to the dripping plate. All heating elements are made of stainless steel AISI 304 quality, without any welding. Heating elements are grounded and has separate fuses for each. System will remain functional even in case one of the elements is broken, while priority aging system avoids risk of all resistances getting failed at the same period. Temperature and pressure inside generator are monitored real time with necessary sensors.

Steam Supply	Integrated Electrical Steam Generator	●	-
	External Central Steam Supply Connection ^a	○	512037
	Dual Selection for Generator & External Supply	○	512038
	Auto-blowdown / Desalination ^b	○	512051
	External Level Indicator for Service ^b	○	512065
		● Standard	○ Optional

^a This configuration does not have an integrated steam generator.

^b Valid only for models with integrated generator.

In devices with an integrated generator, water level is controlled by a 3-level sensor mechanism which enables automatic filling in case of a low level and prevents heaters from turning on in lack of water inside generator for safety. It is possible to limit heater elements to a lower level of 20 KW, in case of a problem in city supply, from software.

MONITORING

Controlling a steam sterilizer through temperature may risk operator life or equipment, as a failure may lead to reach the set temperature value under a higher pressure. To ensure safety, an advanced software which uses steam-enthalpy chart, controls & monitors temperature through pressure in all pressure vessels. The temperature inside chamber must be dual checked to ensure sterilization as per EN 285, so it is cross-checked by PT 100 (DIN Class A) temperature sensors located at different locations of chamber.

	Temperature Sensor	Pressure Transmitter
Chamber	2	2
Generator	N/A	1
Jacket	N/A	1
Gasket	N/A	1

Total 5 pressure transmitters are located at chamber (2 as per EN 285), generator, jacket, and gasket for one to each. Also, there are 2 PT 100 (DIN Class A) temperature sensors inside chamber. To ensure components run properly, an air sensor at air intake is placed as well. Vacuum pump water supply is also controlled by a separate sensor.

	F0 Value Calculation as Indicator ^a	○	512007
Monitoring	Product Temperature Probe as Indicator ^a	○	512036
	Temperature Sensor at Drain Line	○	512080
		● Standard ○ Optional	

^a This option is not suitable for laboratory applications.

To be able to be able to check all parameters for all means, software enables monitoring of pressure and temperature on chamber, jacket, and generator. It is possible to select one of either °C or °F as monitoring unit. In addition, monitoring of gasket pressure is possible. 4 manometers where placed on service side of the sterilizer show analogue values, which can also be monitored on screen.

	On Service Side	●	-
Manometers	On Loading Side	○	512014
	On Unloading Side ^a	○	512081
		● Standard ○ Optional	

^a Valid only for pass-through models.



SAFETY & TESTING

Chamber has been tested up to 10 Bar and works at 134°C under 2,2 Bar in standard operations. Generator has been tested up to 10 Bar and works at 145°C under 3,8 Bar in standard operations.

PLUSTEAM series steam sterilizers provide safety for operator and cycle with various precautions. Control unit checks all parameters of sterilization and complete sterilization if every parameter is OK. In case of a problem it warns user that sterilization is not formed and failed while showing problem status. Some of the additional safety features are:

- Current leak protection.
- Short circuit protection.
- 6 level password protection.
- Error and warnings on screen as pop-up and continuous visual warning on top.
- Audio, visual & printer errors & warnings.
- Water level control with electrodes.
- Disabled manual components controls in case of a risk to operator.
- Voltage fluctuations safety for \pm %10.
- 5 level safety system including safety valve, pressure transmitter, pressure switch, thermostat, and PLC controlled contactor feedback system on generator.
- Fixed type safety valves in chamber, jacket, and generator.
- H14 HEPA filter for air filtration.
- Sensors on air and vacuum pump water.
- Chamber temperature difference warning between two sensors as per EN 285.
- Pneumatic driven door safety sensor to prevent closing and opening back to prevent harm on load and operator.
- Pressure relief system before opening door(s).
- Unable to open both doors at the same time in pass-through models.
- Sterile door does not open unless cycles is successfully completed in pass-through models.
- Fascia temperature below 55°C.
- Motor safety switch.
- Water level sensor protection cap for service safety.

ENERGY SAVING BY GREEN SHIELD

High performance of sterilizers ensure energy saving for time and efforts for operators through already existing functions such as wake up function or height adjustable trolleys. Saving energy by means of water & electricity is also ensured through carefully engineered design. All related hot pipes are designed to pass below the chamber cover sheet to reduce the need for additional energy consumption for keeping chamber and jacket warmed up in a homogeneous manner. Intelligent activation of heating elements reduces use of electricity while keeping device in system ready status. Standby function cuts use of electricity when device is not in use during work shift, while sleep mode prevents waste of electricity even if a cycle is running at the end of the day, by turning the complete functions of all power consumption elements to off.

A self-cleaning, gasket free brazed plate heat exchanger with connection flanges and integrated mounting brackets for cooling drain line in order to speed up cycle times and prevent damaging of drain line of hospital; with cover plates made of stainless steel is used to cool waste water. Flow direction is parallel and it has 8 to 100 plates while volume per channel is 0,054 L. Heat exchanger has a water saving up to 90% on cooling water, compared to continuous flow drain cooling systems, for saving costs and protecting environment by intelligent activation on sense, once it is necessary for a short time period during a running cycle.

Green Shield	Heat Saving Pipe Design	●	-
	Intelligent Heating Elements Control	●	-
	Standby Mode	●	-
	Sleep Mode	●	-
	Aqua EQ Heat Exchanger	○	512012
	Particle Assisted Cooling System (PACS) ^a	○	512082

Chrono Chill Recirculation (CCR) ^a	○	512083
	● Standard	○ Optional

^a Please ask for details.

SCREEN & CONECTIVITY

All controls on sterilizer are done through a touchscreen. In pass-through models, a second touchscreen, acting as a slave with no managing functions is located as standard at unloading side. It is possible to adjust brightness and calibrate screen through software.

Screen	7" Videographic Touchscreen at Loading Side	●	-
	7" Videographic Touchscreen at Unloading Side ^a	●	-
	10" Videographic Touchscreen at Loading Side	○	512018
	10" Videographic Touchscreen at Unloading Side ^a	○	512084
	Manual Door Control Buttons at Loading Side	○	512013
	Manual Door Control Buttons at Unloading Side ^a	○	512085
		● Standard	○ Optional

^a Valid only for pass-through models.

Connectivity is achieved by various ports with specific purposes. A remote access module enables distant access to sterilizer and connect to TBT originated or third-party process flow management software.

	Single	Pass-through		
Connectivity	RS 232 Port	1	2	● -
	RS 485 Port	1	2	● -
	USB Port	1	2	● -
	Ethernet Port	1	1	● -
	Remote Access Module	1	1	● -
	Tracking Ability			● -
	Extra Ethernet Port on Loading Side			○ 512015
	Extra Ethernet Port on Unloading Side			○ 512086
	GSM Connection Module ^a			○ 512034
				● Standard

^a Local line not included.

It is possible to connect to sterilizer from any destination to track its status and actions via internet on PC, mobile phone, or a tablet computer. Status of a running cycle, chamber temperature, chamber pressure, jacket pressure, generator pressure, gasket pressure, steam inlet pneumatic valve status for chamber, steam inlet pneumatic valve status for jacket, air inlet pneumatic valve status for chamber, air inlet pneumatic valve status for gasket are shown for giving detailed information on real time.

SOFTWARE

A microprocessor-controlled PLC controller is used to control automated functions of sterilizer and let user command it. User friendly HMI with intuitive functions consists of an easy to use menu-tree. Pushing 3 buttons on screen is enough to start a cycle. Sterilizer has visual, audio, and printed error & warning systems embedded to software. Self-diagnosis & information system enables easy troubleshooting.

Software has a 6-level password protection system in and a master password for resting low level passwords. Operator password for up to 10 operators can be activated/deactivated by manager level password. It is possible to set up an overall username or leave it empty for manual filling if Level 1 password is deactivated. Level 1, Level 2 and Level 4 passwords can be set by operator and replaced from existing ones.

Level 1	Operator	Monitoring & running sterilizer
Level 2	Manager	Software controls for daily use
Level 3	Service	Manual activation for diagnosis
Level 4	Distributor	Main safety controls & calibration
Level 5	Manufacturer	Pre-saved cycles
Level 6	Software	Complete access
-	Master Key	Resets password below Level 5, exc. Level 3

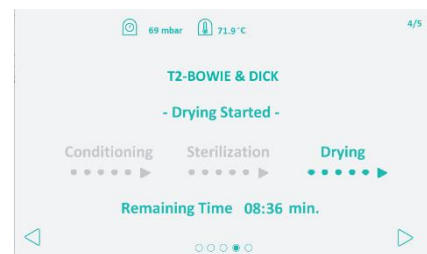
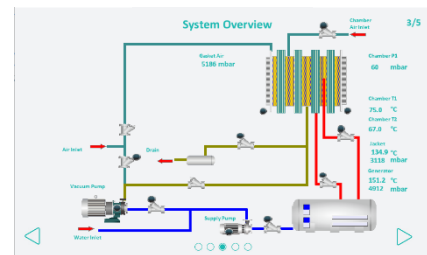
Standby mode is can be activated from software to enable screen saver once device is not in use. Level 2 password is required to activate it and to adjust time interval for activation.

Sleep mode is used to turn device off to save energy at a given time. Once the time to sleep is set, device will close itself unless a cycle is running. In case sleep time is reached during a cycle, software delays it until the end of cycle.

Wake up function let device to reach system ready status at a certain date & time specified by user. It saves worktime and prevents loss of manpower while sterilizers warm up, which may add up 1 additional cycle per work shift. Wake up function consists of also several automated running test options to increase efficient use of time:

Reach System Ready	Warm chamber & jacket, and prepare generator	Default
Start Automatic Leak Test	Starts a Leak Test when system is ready	On User Selection
Start Automatic Warm Up	Starts a Bowie & Dick / Warm Up Test when system is ready	On User Selection
Start Combined Test	Starts a Leak Test when system is ready and then Bowie & Dick / Warm Up Test starts after Leak Test	On User Selection

P & I Diagram menu in software shows all sensor values and component (i.e. valves, pumps, heating elements, door status) status in a colour coded piping diagram. It is also possible to see sensor status and values from analogue menu on a clear screen as well. A complete graph of daily activities witing last 24 hours is saved in memory for controlling past cycles values for time, temperature, and pressure.



Running a cycle is 3 clicks away from main menu. During a sterilization cycle several cycle and device related data is presented. On main screen an info section gives all details on cycle for temperature, pressure, time, and related phase step, including past data of the running cycle. Phase timer shows set time for each phase and counts back while a cycle timer shows approximate time to complete running cycle showing both remaining and elapsed time. Each phase is indicated in a linear chart for snap shooting cycle phase. Actual status of all device parameters including cycle counter is in reach as well. A graph of pressure and temperature inside chamber against time is shown on full scale in real time. Also, all analogue sensor values and status are in reach, together with the P & I Diagram. In case operator needs to work in a distant area, a quick information screen with cycle name & number, action taken, remaining time and a linear process graph is available with increased visibility.

Standard features like setting up date and time or factory resetting sterilizer to initial values or setting up a maintenance clock when a faster maintenance warning is required is possible to set. A status screen gives brief information sterilizer such as user active, daily cycle counter or overall cycle counter.

STERILIZATION CYCLES

PLUSTEAM series steam sterilizers have 7 pre-set cycles, a pre-set drying cycle, 2 test cycles as per EN 285 norms and 100 space for custom cycles in standard. All pre-set cycles, test cycles and 14 of the custom cycles are shortlisted for fast use. Each cycle is defined by a symbol near its name in programs section to give a hint on if it is a test cycle, pre-defined cycle, or a user defined cycle.

Sterilization Cycles	T1 – Leak Test	●	-
	T2 – Bowie & Dick / Warm Up Test	●	-
	P1 – 134°C Surgical Instruments	●	-
	P2 – 134°C Flash	●	-
	P3 – 134°C Heavy Load	●	-
	P4 – 134°C Textiles	●	-
	P5 – 121°C Rubber-Glass	●	-
	P6 – 121°C Gravity	●	-
	P7 – 134°C Prion	●	-
	P8 – Drying	●	-
	105°C Dental Disinfection	○	512010
	Solid Waste in Bag	○	512041
	Liquid Waste in a Container	○	512042
	Self-Cleaning ^a	○	512049

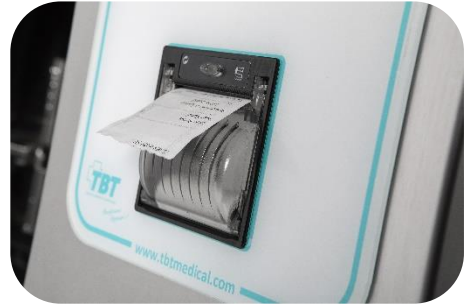
● Standard ○ Optional

^a "Auto-blowdown / Desalination" (Ref. No: 512051) must be in configuration.

Operator can set customs cycles by setting up number of pre-vacuums, sterilization time, sterilization temperature, deep vacuum time and number of drying pulses. PLUSTEAM series can perform effective drying by deep vacuuming, pulsed drying and any combination of these two. It is possible to set number of drying pulses and time interval for each pulse. A time vs. temperature calculator which calculates time necessary to reach SAL (Sterility Assurance Level) when a temperature is given and vice versa is available on custom cycle setting menu.

BATCH DOCUMENTATION

Documentation can be established through computer, thermal printer, ink printer, A4 size printer or recorder. Thermal printer has ability to print 40 characters and show function and alarms related with it visually. It is possible to replace thermal printer with an integrated ink printer or a dual-channel chart recorder for pressure and temperature. Printout shows model, brand, institute name, username, cycle parameters, step by step temperature, time and pressure values of each phase, cycle completed or failed status, any errors happened during cycle and cycle stopped data if it is manually stopped by user. Also, user may customize up to 5 lines in both header and footer as per needs.



An event log of up to 1.500 cycles, is saved including data related with cycle parameters, errors, and warnings. It is possible to reach them separately on screen. If needed, all event log can be downloaded to a computer by ethernet connection or a USB in Microsoft excel format and print by a regular A4 or other sized printer.

A barcode scanner can be adapter to system on request. It enables operator to scan the barcodes before sterilization so that the barcodes (in numeric format) can be printed at printout and saved on event log. Same application is also possible to adapt on unloading side for pass-through systems as well, to confirm receiving of sterile packages at unloading side.

	Thermal Printer	●	-
	A4 Size Printer Connectivity	●	-
	Event Log for Up to 1.500 Cycles	●	-
	PLUSOFT Cycle Manager	○	512035
Documentation	Ink Printer	○	512039
	Dual Channel Chart Recorder	○	512050
	External A4 Dot Matrix Printer ^a	○	512077
	Event Log for Up to 10.000 Cycles	○	512087
	Barcode Scanner on Loading Side ^b	○	512089
	Barcode Scanner on Unloading Side ^b	○	512090

● Standard ○ Optional

^a Dot matrix printer is included.

^b Barcode scanner is included.

OPTIONS, ACCESSORIES & SUPPLEMENTARY EQUIPMENT

PLUSTEAM series include wide range of optional features, accessories, and supplementary equipment to increase efficiency and comfort in workflow, where some of them are mentioned below. Please check options & accessories sheet for more details.

- Transport Trolleys
- Loader / Unloader
- Loading Trolleys & Shelves
- Loading Shelves
- Baskets & Containers
- Management Software
- Energy Saving Systems
- Plinth & Frame Cover
- Wall Cover
- Water Tank
- Manual Pressure Relief
- Feed Water Degassing
- Steam Supply Degassing
- Silent Air Compressor
- Water Softener
- Reverse Osmosis System



PACKING

PLUSTEAM series steam sterilizers are foam supported in critical parts like screen(s) at first. Protective foam and device is rounded by a bubble wrap. Finally, it is placed on a wooden pallet and cased with 20 mm durable carton to stand against possible damages during transport. All packages are marked with necessary warning labels and has a tilt indicator. Additional accessories such as transport carts are delivered with a carton pallet and a carton top.

Packing	20 mm Carton + Wooden Pallet	●	-
	Wooden Cage + Wooden Pallet	○	512000
		● Standard	○ Optional

WATER QUALITY

RO treated water for high performance is required for best performance Water requirements must be according to Annex B of EN 285 standard. It is advised to use RO treated water for steam generator and softened water for supplying vacuum pump.

LIQUID CYCLES

PLUSTEAM series may be designed to proceed liquid cycles for laboratory purposes. Laboratory configuration includes F0 calculations, detailed gravity cycle management and a product temperature load probe inside chamber. Fast cooling is achieved by active jacket cooling by water.

Laboratory Use	Liquids in a Glass Container, w/o Product Temperature Probe	●	-
	Laboratory Configuration w/ Supported Fast Cooling ^a	○	512040
	Laboratory Configuration w/o Supported Fast Cooling ^a	○	512088
		● Standard	○ Optional
^a Please ask for details!			

WARNING: TBT recommends liquids cycles with probe only.

WARNING: Hazardous wastes and explosive materials must not be processed with this sterilizer.

WARNING: Liquids must be processed with appropriate liquid programs only.

WARNING: This sterilizer is not designed to process flammable liquids.

WARNING: When sterilizing liquids, please follow below listed procedures:

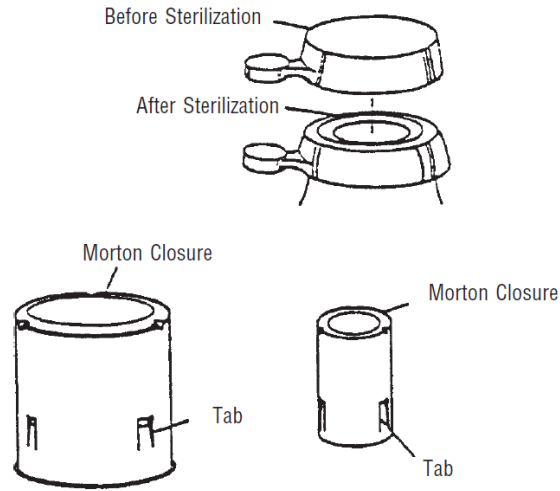
- It is inappropriate for a health care facility to sterilize liquids for direct patient contact.
- Use proper liquid cycles only.
- Use only vented closures.
- Use only Type I borosilicate glass bottles
- Don't allow hot bottles to be jolted.

WARNING: Sterilization of solutions containing chloride (i.e. saline) can cause corrosion in chamber and hence it is not recommended. Clean chamber after each use if it necessary

Please read below text before using liquid cycle and keep warnings listed in mind.

Due to its superior capability of resisting thermal shock, borosilicate glass is required to use in liquid cycles. Using glass without enough thermal resistance may cause greater potential for bursting.

Vented closures release internal pressure by automatically venting the containers due to their design. Pressure in non-vented closure remains until cooling hence affect sterilization and may cause injuries or loss of material properties. Sterilizing liquids in any other type of container or with non-vented closures requires a specially designed sterilizer.



Place small bottles in a separate basket for minimizing sliding. Use side rails in loading carts to prevent falling off. For extremely large liquid loads, a daily air removal test according to AAMI standard ST-46 should run properly.

Below table assume using of vented closures or Erlenmeyer flasks. The "minimum sterilization time" includes the time required to bring the solution up to the sterilization temperature plus the time required to achieve sterilization. Load probes and F_0 option may allow you to optimize cycle times.

Volume of Liquid in One Container	Minimum Recommended Sterilize Time at 121°C ^a
75 mL	25 min.
250 mL	30 min.
500 mL	40 min.
1000 mL	45 min.
1500 mL	50 min.
2000 mL	55 min.
> 2000 mL	55 + 10 min./L

^a Minimum sterilization times are based on obtaining a 10^{-6} SAL (Sterility Assurance Level) with standard test loads. Your specific loads may require different sterilize times to achieve this level of sterility, or you may require a different SAL.