

GETINGE

SERVICE MANUAL

VS 60/90/130



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INTRODUCTION



WARNING!

- As the sterilizer works with steam under pressure, some parts of it may become warm. You should therefore exercise the greatest caution whenever working on the sterilizer.
- Hot steam may flow out of the sterilizer when the door is opened.
- When handling materials and loading the sterilizer, bear in mind that the chamber and the area close to the chamber entrance is very warm.
- Liquids must be sterilised in special programs intended for liquids. The sterilizer's liquid program is solely intended for the sterilisation of liquids in open vessels.



General

The VS-series consists of vertical sterilizers with pre-programmed sterilisation programs. The sterilizer works with steam produced in a chamber, fed with water from an external connection.

WARNING TEXTS IN THIS MANUAL

There are 4 different admonitory levels in the manual:

- **WARNING!**
Factor, circumstance or state that can give rise to the risk of personal injury.
- **CAUTION!**
Factor, circumstance or state that can give rise to the risk of damage to machinery or the process.
- **IMPORTANT!**
Clarification that facilitates the understanding of that described in this manual.
- **TIP!**
Factor, circumstance or state that can facilitate execution or the process.

The following warning symbols is placed on the outside of the sterilizer (symbol acc. to ISO 3864)

If national requirements do not accept this symbol, the symbol must be replaced by a suitable symbol valid in the country where the sterilizer is used.

The warning symbol indicates that the person, responsible for the sterilizer must be fully conversant with all requirements mentioned in the documents for the sterilizer.

**IMPORTANT!**

The warranty on the delivered product is invalidated by faulty installation or an overlooked/incorrect service interval/maintenance. It must be possible to verify service/maintenance.

Warranty

A 2 year warranty is provided. However, not on those components considered to be consumables, for example, door gaskets. For service work, reference should be made to agreements with the supplier.

The Product Liability Act only applies when the instructions in this manual have been followed in their entirety.

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Manufacturer

Getinge Skärhamn AB Industrivägen 5
SE-47131 Skärhamn Sweden

Disposal

This product consists of (percentage by weight)

- 76 % Stainless steel
- 4 % Plastic
- 9 % Aluminium
- 5 % Brass
- 2 % Copper
- 4 % Electronics

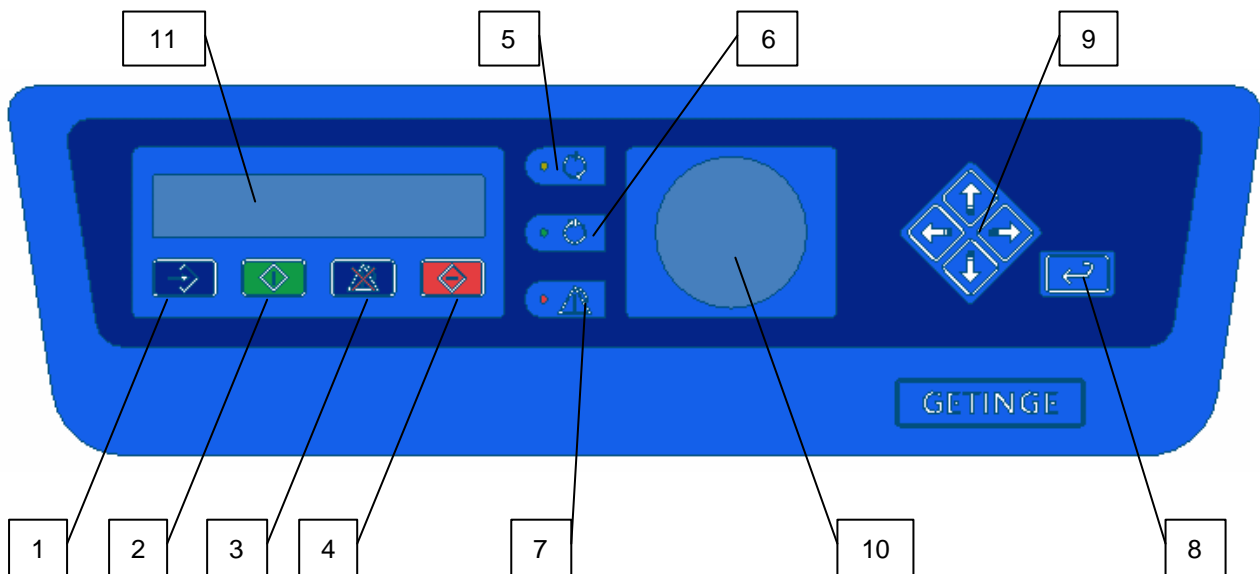
When disposing of the sterilizer, it must be sorted at source in accordance with the requirements set out in the WEEE directive (2002/96/EC).

Contact your dealer when disposing of the sterilizer.

CONTROL PANEL

Layout of the control panel

1. PROGRAM SELECTOR button – selection of the program
2. START button – start of the program
3. RESET button – reset a fault
4. STOP button – emergency stop
5. Yellow status lamp – program in progress
6. Green status lamp – program finished
7. Red status lamp – alarm
8. ENTER button – select items from the menu
9. Arrow keys – navigate through menus/lists
10. Pressure gauge – shows the chamber pressure
11. Display unit



Display unit

Shows the current status, program progress, number of minutes after program start, number of completed cycles and error codes.

IN STANDBY MODE SHOWS:

- Process name (program)
- Sterile time/temperature

Menu

Press the **DOWN arrow** to **CYCLE COUNTER** (twice) and then press the **ENTER button** now press the **DOWN arrow** to read the pressure and load sensor temperature (when the sterilizer features a liquid program).

SHOWN DURING THE PROCESS:

- Process name
- Process time

Home position:

Press the **LEFT arrow** for at least 4 seconds

To specifically read the load sensor temperature (when the sterilizer features a liquid program), press the **ENTER button** at the process name.

Operation, check

INCORRECT OPERATION, CHECKLIST

The table below lists the most common operating faults that result in an alarm (error code) or that certain symptoms are experienced.

Check that usage was correct.

ALARM (ERROR CODE)	REASON
Close door	Door has not been locked before the start button has been pressed. Read the text below the table, Correct operation, checklist .
Sterile error	The sterilizer may have been overloaded. Read the Technical data section .
Door open	The handle has been activated before the finished signal has been displayed. Read the text below the table, Correct operation, checklist .
Process stopped	The stop button has been pressed by the operator.
Heating error	Can be due to items caught in the door.
No water	Perhaps the water supply tap has not been opened
SYMPTOM	REASON
Process abnormally long	Can be due to: <ul style="list-style-type: none"> • no water on the incoming supply. • sterilizer overloaded. Read the Technical data section. • leakage.



WARNING!

Consider the risk of burns when loading the sterilizer.



CAUTION!

Only sterilise items intended for sterilisation with steam and that can withstand at least 121 degrees.

Only use loading equipment especially designed for the VS series. Each standard basket may be loaded with max. 12 kg of goods. To ensure optimal ergonomics use a lifting device when processing heavy loads.

CORRECT OPERATION, CHECKLIST

- 1 Placing items in the sterilising chamber. **Only use loading equipment especially designed for the VS series.** Carefully check that nothing is caught between the door and chamber.

Place moisture-sensitive items and low-mass items at the top of the chamber.

Place heavy items at the bottom of the sterilising chamber.

Place dish-shaped items dish side down.

Place empty containers (bottles, test tubes, etc.) with their opening downwards.

- 2 Close the door and pull the handle clockwise to lock.
- 3 Press the **START button**, the cycle starts and will be completed automatically.



Recommended accessories

Basket, part no. 566687401

Solid, stainless steel container

48325031



WARNING!

Remember the goods are hot after sterilising.

Never attempt to open the door until the pressure gauge has returned completely to zero.

- 4 When the display shows **FINISH**, the green status lamp comes on and when the pressure gauge shows zero the process is completed.
- 5 The display never shows **FINISH** and the green status lamp for process finished never comes on if the process is interrupted.
- 6 As soon as the door is opened **FINISH** is no longer shown on the display, this provides information that if **FINISH** is not shown on the display, then the goods in the chamber may have been loaded by "someone else", but not sterilised.
- 7 If the red status lamp for an alarm is on after a sterilising process, the goods should be considered as unsterilised and must then be sterilised again.

When the door is opened **FINISH** is no longer displayed. The display now shows:

INSTRUMENT 1340C (last selected program)

00.05.00_1340C

LIQUID STERILISATION

- A special liquid program and a load sensor in the chamber are required to sterilise liquids. The liquid process is solely intended for liquid sterilisation in open receptacles.
- Bottles should be filled to max. 80 % of their volume.
- Place the load sensor in the largest container. When there is no space in the liquid for the load sensor, use a control receptacle where the load sensor can be placed. The volume of the liquid in the control receptacle should be as great or greater than the liquid intended for sterilisation. Boiling point for the liquid in the control vessel must be the same as for the liquid to be sterilised.
- Use a receptacle with the smallest possible volume for the fastest processing.



IMPORTANT!

If the process must be cancelled for one reason or another press the **STOP button**; the red status lamp will come on and an audio signal with sound.
Now press the **RESET button** and wait for the pressure gauge to drop to zero.
When the red status lamp indicating an alarm has gone out, press the **RESET button**.
Open the door.



IMPORTANT!

When a process is interrupted, there is a risk of steam streaming out of the chamber when the door is opened.

INTERRUPTED PROCESS

If the sterilizer stops the process:

- 1 Press the **RESET button**; the audio signal stops.
- 2 Wait until the pressure indication shows zero.
- 3 When the red status lamp has gone out:
- 4 Press the **RESET button**; the alarm text is no longer displayed

If a process in progress has to be interrupted:

- 1 Press the **STOP button**; the text **PROCESS STOPPED** is shown on the display. The audio signal sounds and the red status light comes on.
- 2 Press the **RESET button**; the audio signal stops.
- 3 Wait until the pressure indication shows zero.
- 4 When the red status lamp has gone out, press the **RESET button**; the alarm text is no longer displayed.

PERIODIC MAINTENANCE



WARNING!

The outer casing may only be removed by technicians with documented experience.



WARNING!

Bear in mind when cleaning that the chamber and the area close to the chamber entrance is very warm.



TIP!

The following Service kits are available:

- Disks for solenoid valves
- Grease for door gaskets



WARNING!

The electrical power supply must always be disconnected with all types of maintenance work.

General

The manufacturer recommends at full utilization of capacity that at least the following maintenance operations should be performed at the specified intervals with by service technicians. Monthly and weekly maintenance is carried out by the operator as set out in the user manual.

Annual maintenance

ANNUALLY OR AT LEAST EVERY 400 CYCLES UNLESS OTHERWISE STATED.

- Replace the filter where appropriate (accessory). Check that the filter is not wet.
- Replace the plunger and O-ring on MV-1, MV-2, MV-6 and MV-8. Refer to the section **Component check, 3. Solenoid valves**.
- Check the door and its flange. Lubricate the moving parts by the door gasket. Use a grease suitable for use in the food industry.
- Replace the door gasket. At least every 3rd year or 1200 cycles. See the section **Component check, 20. Door, Door gasket**.
- Measure the pressure using a calibrated absolute test pressure gauge, use the intended flange marked VT on the sterilizer. See the section **Component check, 12. Absolute pressure sensor**.
- Inspect and rectify any leakage from pipe couplings and instrument connections. See the section **Advanced trouble shooting, Trouble shooting leakage**.
- Check and clean the water outlet in the chamber. At least every 800 cycles.
- Check that the monthly and daily maintenance have been carried out correctly.

- Perform a functional check of the electrical components. See the section **Component check**. At least every 1200 cycles or every 3rd year.
- Reset the service alarm from the Service messages menu. (situated under **SETUP/SYSTEM/SERVICE** in the menu tree)

SAFETY CHECKS



- Check that the door seals against the steam pressure during the sterilising process. See the section **Component check, 20. Door**.
- Check that the sterilizer can not be started when the door has not been closed. See the section **Component check, 20. Door**.
- Check that the door's counter-hold spring works and prevents crush injuries. See the section **Component check, 20. Door, check the door spring**
- Inform the customer about the significance of the warning signs.
- Inform the customer of the risks involved with the program for sterilising liquids, if installed. Particularly the information that it is only permitted to sterilise liquids in **open** vessels.

Monthly maintenance

MONTHLY, OR AS REQUIRED

- Clean the bottom filter. See the section **Component check, 1. Chamber**.
- Clean the chamber. See the section **Component check, 1. Chamber**.
- Clean the door gasket and lubricate with the grease recommended by Getinge.

Daily maintenance

- Check that the overheating protection sensor is fitted on the heating element, see fig 1. See the section **Component check, 6. Overheating protection**.
- Check that the level guard in the bottom of the chamber is clean, fig. 2. See the section **Component check, 1. Chamber**.

Fig. 1

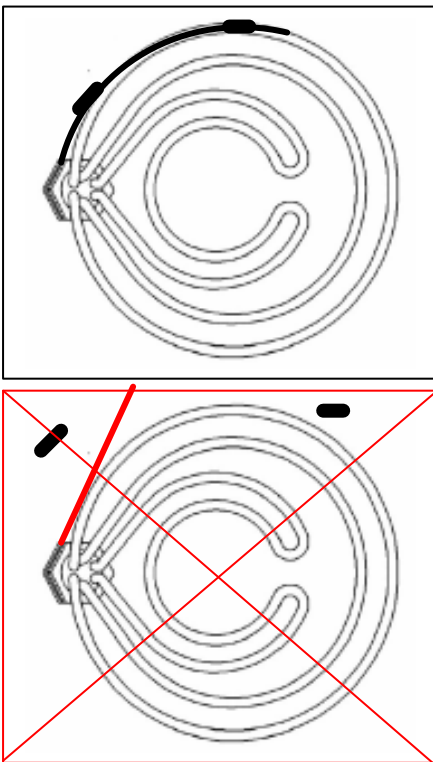
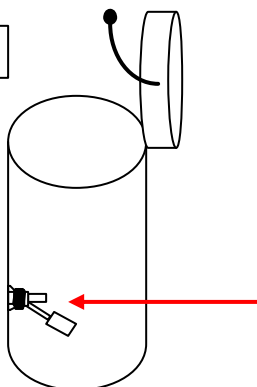
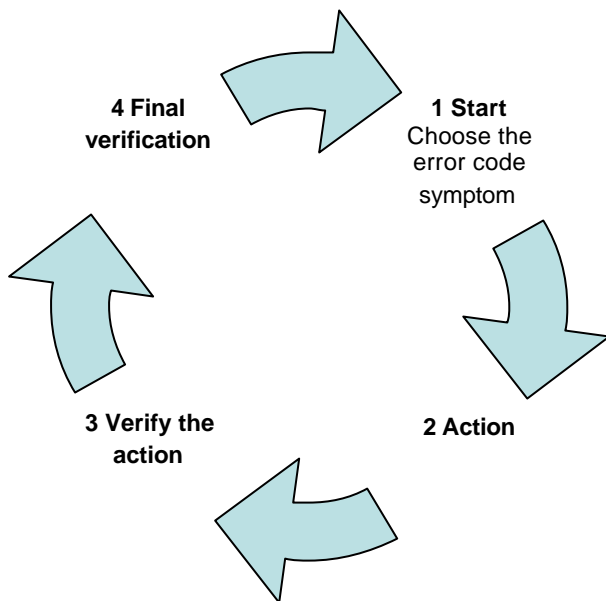


Fig. 2



START TROUBLE SHOOTING

Trouble shooting orientation



IMPORTANT!

The actions stated in the tables are usually specific checks on the components. However, the actions can also represent **advanced trouble shooting** and indicate the specific component to be checked.



IMPORTANT!

After the action (for example, component replacement) the **action must be verified** (e.g. manual activation). In addition, it must be verified that the error code/customer's experienced symptom has been corrected. Several actions may be needed with subsequent action verification, remember to always **end with verification against the error code/symptom**.

START TROUBLE SHOOTING HERE

Choose the error code/codes displayed and the symptom experienced in the table below. Carry out the prescribed actions in the stated order, until the fault has been identified and corrected.

CHECK PROCEDURE

1 START

Select the alarm (error code) or symptom in the tables below.

2 ACTION

Carry out the actions set out in the table. Carry out the actions in the stated order, continue until the fault has been corrected.

- Check the components. In the event of a component fault, repair or replace it. Instructions are enclosed with the spare part or are set out after each check.
- Should the check indicate that the component is OK, return to the table in this section and continue with next action as per point 2.

3 VERIFY ACTION

After repair/replacement the action must be verified. Instructions concerning verification are enclosed with the spare part or are set out after each check.

4 FINAL VERIFICATION

(ERROR CODE/SYMPTOM VERIFICATION)

After action verification it must be verified that the displayed error code is not displayed again and the experienced symptom no longer remains. This is done by running a program and checking that no error codes are displayed or the symptoms are experienced.

Alarm (error codes visible on the display)

EXPLANATIONS

Explanations to references to sections stated in the tables below:

CC : chapter **Component check**

Advanced trouble shooting: chapter **Advanced trouble shooting**

Other references are given in plain text.

ERROR CODE	EXPLANATION	ACTIONS IN ORDER OF PRIORITY
GETINGE PACS 300 GETINGE PACS 300 DISPLAY	Process does not start, frozen process	<ol style="list-style-type: none"> 1. CC, 19. Software PACS cold start 2. CC, 18. Display 3. CC, 17. Circuit board
CLOSE THE DOOR	Door unlocked at point of start	<ol style="list-style-type: none"> 1. Operation, check 2. CC, 20. Door, (micro-switch) 3. CC, 17. Circuit board
DOOR OPEN	Door open during process	<ol style="list-style-type: none"> 1. Operation, check 2. CC, 20. Door, (micro-switch) 3. CC, 17. Circuit board
POWER FAILURE	Power failure during process	<ol style="list-style-type: none"> 1. Check external fuses. 2. CC, 6. Overheating protection 3. CC, 17. Circuit board (Fuse) 4. CC, 17. Circuit board
PT-100 ERROR	Error on load sensor during process	<ol style="list-style-type: none"> 1. CC, 15. Load temperature sensor 2. CC, 17. Circuit board AI
SERVICE	Service indicator.	<ol style="list-style-type: none"> 1. Contact the service technician
STERILE ERROR	Incorrect pressure/steam temperature in the sterile phase	<ol style="list-style-type: none"> 1. Operation, check 2. CC, 15. Load temperature sensor 3. CC, 12. Absolute pressure sensor, 4. CC, 17. Circuit board
PROCESS STOPPED	The process has been stopped with the STOP button	<ol style="list-style-type: none"> 1. Operation, check 2. CC, 18. Display
PRESSURE SENSOR ERROR	Pressure sensor incorrectly calibrated	<ol style="list-style-type: none"> 1. Advanced trouble shooting, Checks with error code
UPDATE	Battery replacement or circuit board fault	<ol style="list-style-type: none"> 1. CC, 17. Circuit board

ERROR CODE	EXPLANATION	ACTIONS IN ORDER OF PRIORITY
NO WATER	Timeout level guard	<ol style="list-style-type: none"> 1. Operation, check 2. CC, 10. Level guard 3. CC, 3. Solenoid valve MV-3
HEATING ERROR	Timeout heater	<ol style="list-style-type: none"> 1. CC, 6. Overheating protection 2. CC, 5. Relay 3. CC, 4. Heater 4. CC, 17. Circuit board
HEATING ERROR	Leakage	Trouble shoot according to the section Trouble shooting leakage
MANUAL MODE	Component manually activated	<ol style="list-style-type: none"> 1. Operation, check 2. An output on the circuit board has been set to manual mode. (menu tree Diagnostic)
POST TREATMENT ER-ROR	Outlet valve clogged	CC, 3. Solenoid valve, MV-1
POST TREATMENT ER-ROR	Screen in the chamber clogged	CC, 3. Strainer

Symptom (experienced by user)

EXPLANATIONS

Explanations to references to sections stated in the tables below:

CC: chapter **Component check**

Advanced trouble shooting: chapter **Advanced trouble shooting**

Other references are given in plain text.

SYMPTOM	ACTIONS IN ORDER OF PRIORITY
No ready signal	<ol style="list-style-type: none"> 1. CC, 12. Absolute pressure sensor 2. CC, 3. Solenoid valve MV-2 3. CC, 11. Air filter
Instruments rust in the sterilizer	<ol style="list-style-type: none"> 1. Poor quality instruments 2. Water cleaning filter – type de-ionization, check (see documentation supplied with the water filter)
Process time abnormally long	<ol style="list-style-type: none"> 1. See the section installation. Electricity, Water requirement 2. Advanced trouble shooting, Leakage test, check 3. Operation, check 4. CC, 22. Strainer
Humming noise in standby mode	<ol style="list-style-type: none"> 1. CC, 3. Solenoid valves
Door hard to open/cannot be opened	<ol style="list-style-type: none"> 1. CC, 3. Solenoid valve MV-8 2. CC, 20. Door, (lock)
Pressure gauge shows pressure with the door open	<ol style="list-style-type: none"> 1. CC, 14. Pressure gauge
Steam leaks from the door	<ol style="list-style-type: none"> 1. CC, 20. Door, door gasket 2. CC, 3. Solenoid valve MV-5 3. CC, 21 Pressure relief valve door gasket
Black background on the display	<ol style="list-style-type: none"> 1. CC, 23 Fan. 2. CC, 18 Display
Unstable measurement value and text on display	<ol style="list-style-type: none"> 1. CC, 23 Fan. 2. CC, 18 Display 3. CC 17 Circuit board 4. Check the power supply (Fluctuations?)

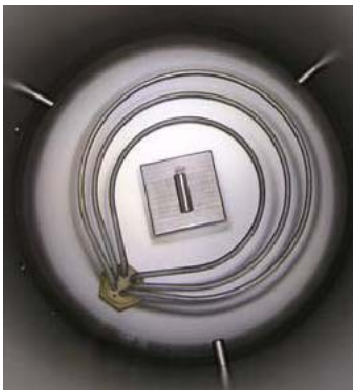
COMPONENT CHECK

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**IMPORTANT!**

Only use Teflon tape that is intended for sealing pipe couplings against steam pressure.

**TIP!**

Check whether steam is let out with an overpressure.

- Use soapy water on cold components
- Use a mirror on hot components

1. General

It is extremely important for safe functionality that all nipples are tightened so that air, which can jeopardize the sterilisation result, can not enter the chamber. If pipe couplings must be removed while performing checks, think about the following when assembling:

- Use ample Teflon tape, so that the tape partly forms a seal and partly seals the threads.

2. Chamber

The chamber walls are cleaned using a mild lime dissolving agent. Rinse well. Drain by closing the door, the bottom valve then opens automatically.

BOTTOM FILTER (ALSO SEE 23. SCREEN)

Lift out the filter. Clean

LEVEL GUARD (ALSO SEE 11. LEVEL GUARD)

Check that the rocker moves up and down easily.

3. Pipe/pipe couplings

Check:

Start a 134 °C program. Trouble shoot when the sterilizer is in "Sterilisation" mode.

Check whether steam is let out.

Action:

Check according to respective component checks. Also see 1. **General**.

Verification:

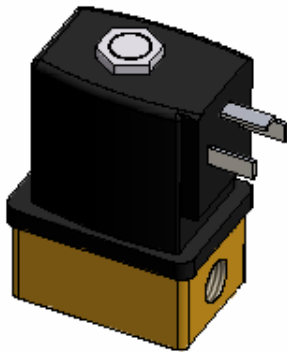
Check all pipes/pipe couplings again.

4. Solenoid valves



IMPORTANT!

All valves open in an energised state.



Pay attention to solenoid valves that hum! The noise may be a forewarning about the coil starting to over-heat due to it not working in a closed iron circuit. This can occur when the moving core is influenced by the magnetic forces from the winding and dirt prevents the coil from reaching the end position. An air gap is then formed in the magnetic circuit, which lowers the inductance in the coil resulting in increased current.

MV-1

Is fitted in the bottom of the sterilizer and has the task of evacuating any remaining water in the sterilizer at the end of the process.

Check:

Check that both the plunger and the area it runs in are clean. Always change the O-ring that seals between the coil and housing after removing the coil. Activate MV-3 and fill the chamber. Activate MV-1 and MV4 (ejector). Check that the water runs out of the chamber again. Measure the voltage across the coil.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Check that the water level in the chamber is maintained for a long period (about 15 minutes).

MV-2

Is fitted at the rear, top edge of the sterilizer. Takes care of pressure equalization after the post-vacuum phase by releasing air into the chamber. The valve is open when the sterilizer is in standby mode if the door is locked. It becomes de-energised as soon as the door is opened.

Check:

Check that both the plunger and the area it runs in are clean. Always change the O-ring that seals between the coil and housing after removing the coil. Activate MV-4 and MV-2 on the diagnostic menu. The pressure should not drop appreciably below atmospheric pressure. Measure the voltage across the coil.

Check for leakage: Dismantle BV-2. Activate MV-3 and the heater. No steam should come out of MV-2.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Run a sterilisation program. Check for leakage ac-

COMPONENT CHECK

according to **Check** and that pressure equalization takes place at the end of the program.

MV-3

Is fitted directly on the inlet. Loads the chamber with water at the start of the process.

Check the opening function:

Activate MV-3 in the diagnostic menu; water should then flow into the chamber.

Check the closing function:

In standby mode, check that the water level in the chamber does not rise once the valve to the chamber has been closed.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Run a sterilisation program. Check that no water enters the chamber after the process has ended and the door is open.

MV-4

Opens the water flow to the ejector to produce a vacuum

Check:

Check that water does not run out of the drain hose in standby mode

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Run a process and check again that water does not run out of the drain hose in standby mode.

MV-5

Pressurises the door gasket before a program.

Check:

During the process, check that the door seals against steam.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Check the door for steam leakage.

MV-6

Vents the chamber while the program is running. Opens at the given time interval. Also simplifies eva-



IMPORTANT!

Minor steam leakage can be due to a leaking gasket and has nothing to do with the MV-5 function

evacuation of the chamber pressure after sterilisation is completed.

Check:

Build up a pressure in the chamber. Open MV-6. The chamber pressure should drop. Check that the chamber pressure is maintained when MV-6 is closed. Pipes on the outlet side should be cooler than on the pressurised side.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Run a program. Now verify according to **Check**, see above.

MV-8

Evacuates the door gasket pressure after the completed process.

Check:

Close and lock the door. Open MV-5 and open MV-8. Water should flow out of the drain.

Action:

Clean and replace the plunger and O-ring. Replace the entire valve if necessary.

Verification:

Run a process. The door should be easy to unlock after the completed process.



IMPORTANT!

A symptom of poor opening function in the valve is difficult door opening.

5. Heater

Is fitted in the bottom of the chamber and has the task of heating the water dosed for the process.

Check:

Activate the heater. Measure with a clamp-on ammeter, this should show about 8 A/coil. The heater output is 2000 W x3 coils, which gives a resistance of about 27 Ω /coil. Check the resistance.

Action:

Replace the heater with incorrect resistance.

If the clamp-on ammeter shows 0 A, and the relay and circuit board are OK. Replace the heater.

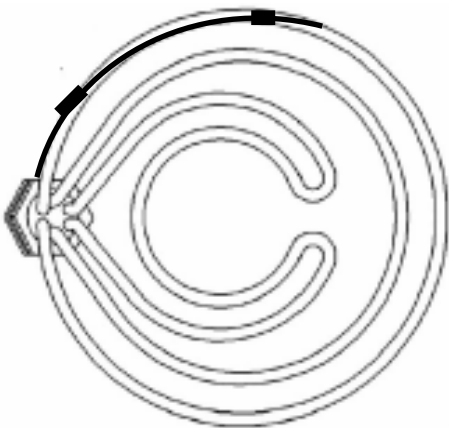
Verification:

Verify by measuring the resistance.



TIP!

Ensure the heater is de-energised before you measure the resistance.



6. Relay

Is fitted in the distribution box. Its task is to connect the heater to the power supply.

Check:

Activate the heater, measure the coil on the relay using a voltmeter. The coil is across A1-A2. Measure the voltage on the outgoing connection 2 - 4 - 6



7. Overheating protection, resetting

Protects the heater against overheating, the protection trips at approx. 300 °C. Requires manual resetting. The sensor is positioned on the heater coil. The resetting button is positioned on the protection. A symptom that the overheating protection has tripped is the timeout alarm, heating error.

Possible causes:

- That the sterilizer has been transported in temperatures below freezing.
- That a fault has occurred in the temperature regulation of the heater.
- That leakage results in the water being consumed during the process.

The unit should always be de-energised when resetting.

Check:

Check that the manual resetting button is pressed in. Measure the voltage on the incoming and outgoing pins on the protection. Voltage on the incoming but not on the outgoing, means that the protection has tripped or is faulty.

Action:

Replace the overheating protection. Make sure that the sensor is correctly fitted on the heater. Also see daily maintenance

Verification:

Check that the sterilizer display is lit.



IMPORTANT!

Note that if overheating protection trips due to a temperature outside of the working range (0 - 300 °C), the sterilizer must cool for a period so that the resetting button shall remain pressed in. Wait until the sterilizer is within the working range again.

Note that it may also require a great deal of force to press in the overheating protection.



CAUTION!

Check that the overheating protection sensor is fitted correctly on the heater. Otherwise the sensor has no function.

8. Non return valve BV-1

Is fitted between MV-1 and the chamber and has the purpose of preventing return flow through MV-3

Check:

Fill the chamber with an open door by opening MV-3. Shut the main tap and let MV-3 remain energised and open MV-4. Check whether water is running out from the drain or that the level in the chamber drops over a long period of time, at least 15 minutes.

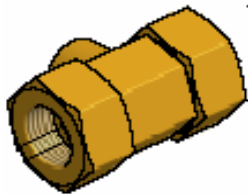
Action:

Replace BV-1.

Verification:

As Check, see above.

9. Non return valve BV-2



Is fitted between the air filter and MV-2. Its task is to prevent steam, with a fault on MV-2 being forced through the filter.

Check:

Close and lock the door. Remove the air filter. Build up a pressure; open MV5 and MV1, close MV1, activate the heater, open MV2. The pressure should rise to 1 bar according to the front pressure gauge. Check that no steam comes out of the air filter holder.

Action:

Replace BV-2. Check that the air filter is not wet.

Verification:

As Check, see above.

10. Non return valve BV-3



Is fitted after MV-1 and has the task of preventing water from the ejector returning up into the chamber

Check:

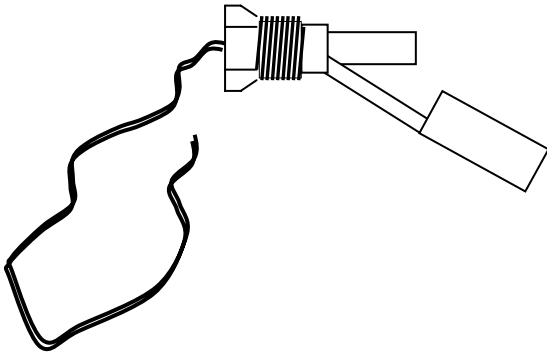
Open MV-4 and MV-1. Check that no water enters the chamber.

Action:

Replace BV-3

Verification:

As Check, see above.



11. Level guard

Is fitted in the lower part of the chamber above the heater. The task is to check the filling of the chamber.

Check:

Move the rocker arm up and down so the digital input (Service, Diagnostic, Digital input) should switch between 1 and 0.

12. Air filter (accessory)

Its task is to supply the sterilizer with sterile filtered air after the post vacuum phase.

Check:

The air filter must be dry. Check that pressure equalization takes place after the post vacuum phase in the program.

Action:

Replace the filter.

Verification:

Run a program. Also see section **BV-2**, check.

13. Absolute pressure sensor

Its task is to monitor and control the process.

Check:

Carried out with an independently, calibrated pressure gauge for the absolute pressure, whose values are compared with the values shown on the display. Area: 0 - 4 bar absolute pressure corresponds to 4 – 20 mA, output signal with an open lid approx. 8 mA

Action:

When the deviation is significant, replace the sensor and calibrate. With minor deviation, calibrate. Calibration is carried out via the menu tree. Step using the **UP arrow** and the **ENTER button** through SETUP/ SYSTEM/ (password)/ CALIBRATION/ MANUAL CALIBRATION. Select the sensor and adjust index A or B up or down depending on the type of fault indication. B with vacuum and A with a sterile pressure.

Verification:

Run a sterilisation program. Perform with an independently, calibrated pressure gauge for the absolute pressure whose pressure values are compared with the values shown on the display.



CAUTION!

Connect the pressure gauge for the absolute pressure to the outlet on the lead-through at the rear of the chamber.



TIP!

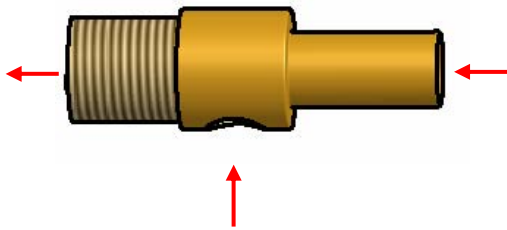
Start a program and stop it by using the "Pause" switch in the vacuum and sterile phase. Then adjust the A-value (sterile phase) and the B-value (vacuum)



TIP!

Use the program CS1000 (for PC), for a basic calibration procedure.

14. Ejector



The ejector is mounted on the pipe from the water inlet to the drain. The ejector's function is to create an underpressure in the chamber.

Check:

Activate MV-1 and MV-4 through the diagnostic menu. The pressure shall, under the condition that BV-3 is problem free and the water pressure is above 1.5 Bar, reach a vacuum greater than 800 mBar within 15 minutes.

Action:

Clean the ejector. Any dirt or leakage in the ejector connections cause impaired vacuum capacity.

Verification:

Check the depth of vacuum according to the check section above.



CAUTION!

The pressure gauge only gives an indication of the pressure and should not be used during calibration.

15. Pressure gauge

Is placed on the front of the sterilizer. Shows the chamber pressure even if the power is switched off.

Check:

When the door is open the pressure should show 0 \pm 0.1 bar. Check that the pointer indicates a pressure higher and lower than zero during a cycle.

Action:

Calibrate the pressure gauge according to the section **Pressure gauge adjustment**. If it is not possible, replace the pressure gauge.

Verification:

Run a program. Compare the pressure gauge with the pressure indication on the display.

PRESSURE GAUGE ADJUSTMENT

- Make sure the door is open.
- Open the front.
- Loosen the brass nipple at the rear of the pressure gauge and lift out the pressure gauge.
- Pry loose the pressure gauge glass by inserting a screwdriver in the notch at the top of the pressure gauge glass.
- Insert narrow tipped pliers under the pointer and lift it off.
- Adjust and press back the pointer in the right position.

16. Load temperature sensor (accessory)

TEMPERATURE SENSOR

The sensor is placed in the lead-through to the chamber and is connected to contact piece X2 on the circuit board. It monitors the sterile process and provides the display with information about the temperature of the liquid that sterilises and controls that the liquid is under 95°C before the door can be opened.

Check:

Loosen the connection on the circuit board and measure the resistance on the sensor with an ohmmeter. The sensor's resistance should at 20 ° be about 120 ohm. The higher the temperature, the higher the resistance.

Action:

With a resistance above 150 ohm or 0 ohm. Replace the sensor.

Check for leakage:

Check that there is no steam leakage from the sensor's lead-through – silicone seal.

Action:

With leakage – replace the silicone seal.



17. Pressure relief valve

The function of the pressure relief valve is to relieve the pressure in the chamber, should this rise uncontrolledly.

Check:

Start a process. When “sterilisation” is reached, close MV-1 and MV-6 as well as start the heater. Check using an independently calibrated pressure gauge for absolute pressure that the opening pressure is 3.7 ±0.14 bar (absolute pressure). Check that the pressure relief valve does not leak water or steam at normal sterilisation pressure – max 3.15 bar.

Action:

Clean the valve. Replace the valve if necessary.

Verification:

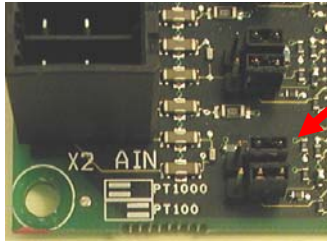
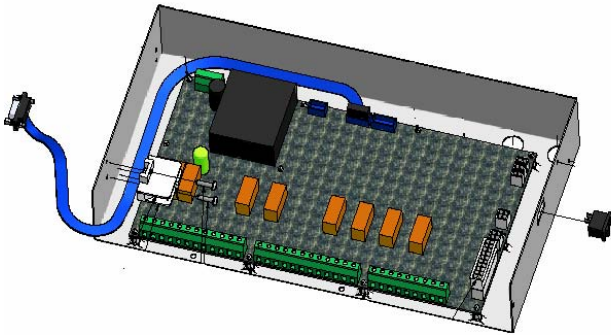
Run up the chamber pressure, activate the heater and close MV1 and MV6. Read when the pressure relief valve trips. Check that the valve does not leak during a program



WARNING!

Adjustments or actions that alter the opening pressure on the pressure relief valve may only be performed by persons with documented experience.

18. Circuit board



Is located in the casing to the right. Its function is to bridge all input and output signals with the software PACS. The circuit board houses, among others, the flash memory that holds the PACS software and the battery.

Check the circuit board:

- Incoming voltage on X23.
- That PT100/PT1000 jumpers are located correctly: PT 100 position
- Fuse 315 mA.
- Voltage on the battery, 3.6 V.
- Connect the cables and connectors.

Check the relays:

To check the function of a relay, activate each output, connect a voltmeter between Line N (X23) and each output. The voltmeter should show approx. 230 VAC. On connection COM 1 (X32) the board is equipped with a serial communication port (RS232) for connection e.g. to a computer.

Action:

Replacing the battery.

Make a backup of the software according to the section **25 Software PACS**, if possible.

Cut off the battery solder tags as close to the battery as possible.

Do not solder on the circuit board!

Solder in the new battery on the old solder tags.

Check that the new battery's voltage is 3.7 V

Perform a cold start according to **25 Software PACS, Cold start**.

Action:

If the above does not correspond, correct or replace the board.

Verification:

Run a prepacked program.

Replacing the circuit board

Move over the flashmemory circuit from the old board. Check the circuit board according to the section above.

Perform a cold start according to 25 Software PACS, Cold start.

Set the time and date and the language version

Go to the menu TOOLS-PACS and select **SAVE RAM TO FLASH**.



CAUTION!

The display unit and the circuit board unit must always be kept in shielded bags until the components are to be installed in the sterilizer. Make sure not to be electro statically charged when these parts are handled, by e.g. touching an earthed heater or by using an ESD wrist strap.



WARNING!

Lithium battery. Explosion risk. Replace the battery with the same type as recommended by Getinge.



TIP!

Battery
When battery replacement is necessary and no battery is available, the sterilizer can temporarily be run with jumper (see section **25 Software PACS, Cold start**) in cold start mode.
The calendar and process counter do not work in cold start mode.

19. Display



Is placed on the front of the sterilizer. Its task is to show values and act as the interface to the PACS software. The display board is connected to X26 on the circuit board. The keypad in the decal is connected to contacts J1 and J3 on the display card.

Check:

Check the cables including connection X26. Check jumper JP1. Should be fitted between pins 1 and 2.

Action:

Replace the display card.

Verification:

Run a program and make sure the display communicates without interference.

20. PACS software

Is installed in the flash memory on the circuit board. Its function is to monitor and govern the entire sterilizer and the processes run on it. PACS also logs events and alarms.

Action:

MAKE A BACKUP.

Follow the following when the sterilizer's program version is to be saved on a PC:

NOTE. The calibration settings will not be saved on this back up.

Connect your PC to contact X32 on the sterilizer use the communications cable.

Start the CS 100 program. State the service password
Go to the menu TOOLS-PACS to RAM/
UPLOAD TO FILE.

Now save the backup file on the hard drive in the PC.

LOAD A NEW BACKUP

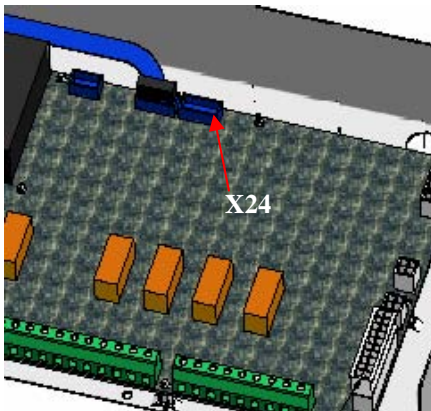
Connect your PC to contact X32 on the sterilizer use the communications cable.

Start the CS 100 program. State the password
Go to the menu TOOLS-PACS and select **SAVE RAM TO FLASH.**

Go to the same menu and select RAM/ DOWNLOAD FROM FILE.

Set the time and date and the language version

Go to the menu TOOLS-PACS and select **SAVE RAM TO FLASH.**



Verification:

connect an external pressure gauge intended for absolute pressure. Run a process and check the calibration against the display.

BACK UP THROUGH A NEW FLASH MEMORY

Connect your PC to contact X32 on the sterilizer use the communications cable.

Start the CS 100 program. State the password

Go to the menu TOOLS-PACS and select **SAVE RAM TO FLASH**

Switch off the power and change FLASH circuit

Make a "cold start" see below

Set the time and date and the language version

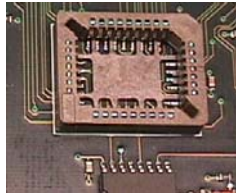
Go to the menu TOOLS-PACS and select **SAVE RAM TO FLASH**

COLD START

Switch off the power and place the jumper (marked with an arrow in picture) to position **Cold start**.

Switch on the power again, wait a few seconds.

Place the jumper in the **Normal** position

**POST VACUUM ADJUSTMENT**

How to navigate through the menus, see the section **Main menus**. Password. Step as set out in the section **Menu navigation**. The post vacuum time is adjustable up to 30 minutes. A value lower than the factory setting can not be made.

21. Door



Door is locked mechanically by a bayonet mount and 10 flanges. The door gasket seals through the gasket groove being pressurised at the start of the process which then presses against the door.

Open and close the sterilizer door several times in a row and check that there is no play on the door and hinge. Also check that the door spring has not become too weak or has broken.

Check:

Check that a process can not be started if the door is not closed correctly. Check the hinge joints, micro-switch and door lock.

Action:

- Clean and lubricate the door's moving parts.
- Check the wear to the hinge joint, change if necessary.
- Check the micro-switch by activating it manually and read the display (switches between the program parameter and "START OK" on the display)
- Check the door lock moves easily and does not jam. Check especially that it reaches all the way in the deactivated position.

Verification:

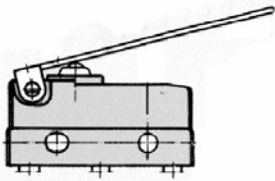
Open and close the door. The door's movement should not be more resistant than it can be closed using normal force. In general as in **Action**.

Check the door spring:

Check that the door spring has not become too weak or has broken by opening the door. The door spring shall prevent the door from shutting.

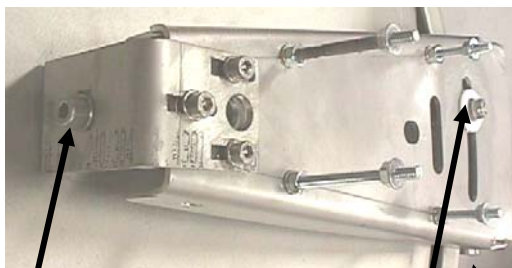
Action:

- Remove the door's plastic cover
- Open the door as far as possible
- Loosen the nut (6)
- Loosen the index screw (7). Remove the door
- Remove both clasps holding the spring axle. Secured with six nuts under the axle
- Remove the circlip (8) located at the end of the spring axle.
- Pull off the axle



IMPORTANT!

The door must be fully open (110°) to carry out the action.



7

6

8

- Change the spring. Press the spring leg in the door holder.
- Refit in the reverse order
- Centre the door with the help of the screw (7)

Verification:

Open the door and check that the door spring prevents the door from shutting.

DOOR GASKET

Door is locked mechanically by a bayonet mount and 10 flanges. The door gasket seals through the gasket groove being pressurised at the start of the process which then presses against the door.

Check:

Check that the gasket is in one piece and that the contact surfaces are clean and lubricated with a food industry grease.

Action:

The door gasket should be replaced after max 1200 cycles/once every 3rd year. Close the water connection before replacing the door gasket.

Open the door

Remove the gasket using a blunt tool

Check that the gasket groove is clean

Clean the groove if necessary

Grease the new gasket

Press the new gasket in the groove fully

Verification:

Close the door and run a program 134 °C check for leakage. Also see section **Component check, 4. Solenoid valves, MV-5 and MV-8.**



IMPORTANT!

Check that steam does not blow out around the door when the pressure is built up.

22. Pressure relief valve, door gasket



Used to release the water pressure in the door gasket groove if the pressure exceeds 4.8 bar

Check:

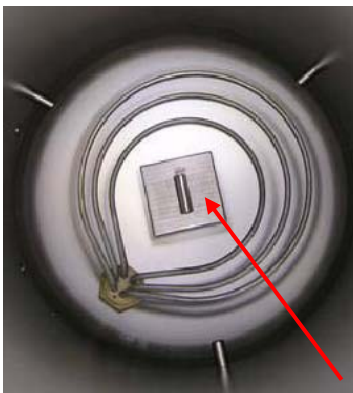
Check that the pipe after the pressure relief valve is not hot during "sterilisation".

Action:

Replace the pressure relief valve

Verification:

Run a new process and check whether the pipe is hot



23. Screen

Is positioned in the bottom of the chamber to prevent a stoppage in the outlet.

Check:

Remove the screen, by lifting it straight up from the chamber

Action:

Clean the screen

Verification:

Make a visual inspection that the screen is clean.

24. Fan

The fan is positioned behind the casing and is connected to contact piece X16 on the circuit board. Its task is to lower the temperature under the casing when the process is run.

Check:

Loosen the casing and check that the fan rotates when a process is run. Check that the fan is voltage fed.

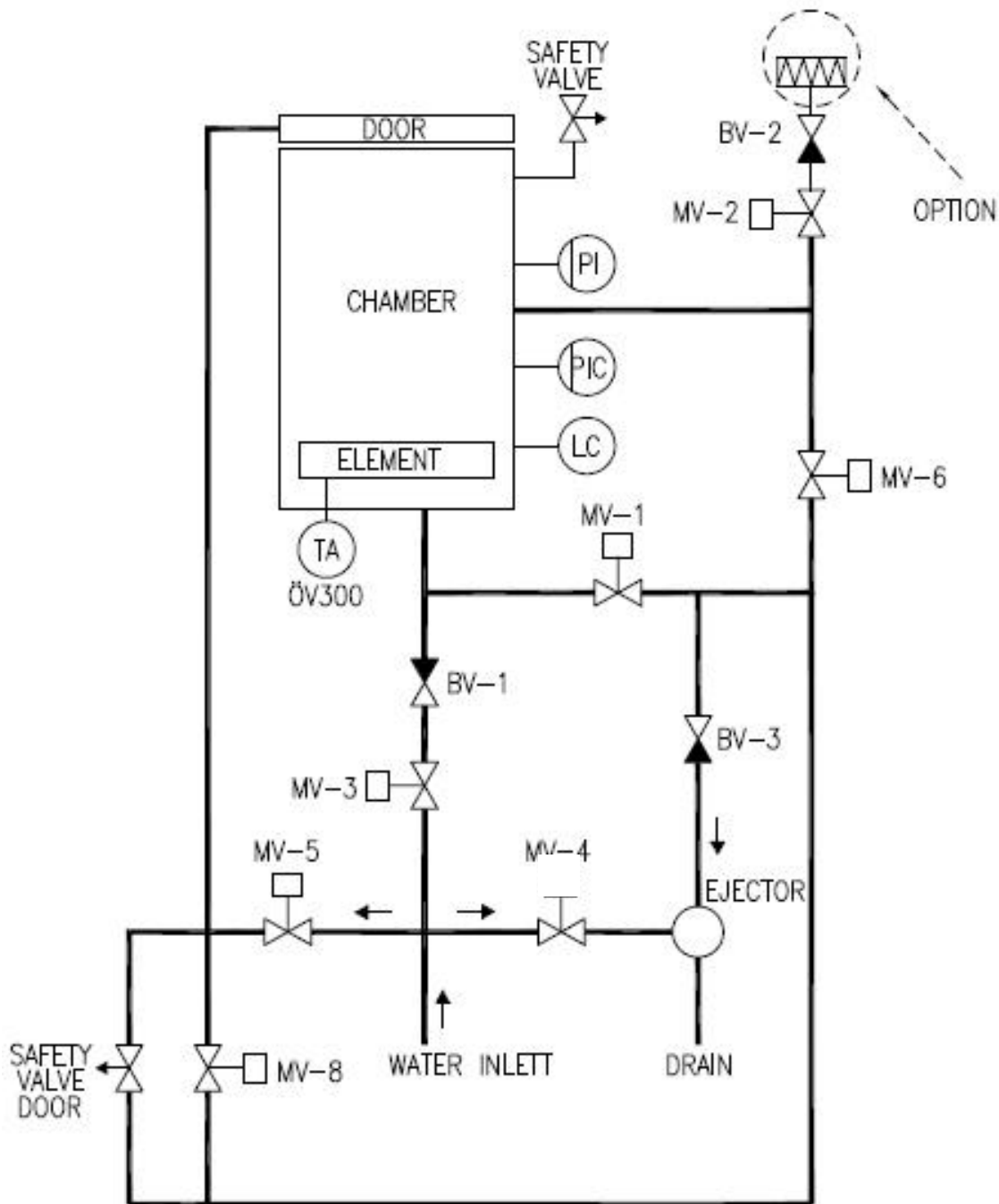
Action:

Replace the fan

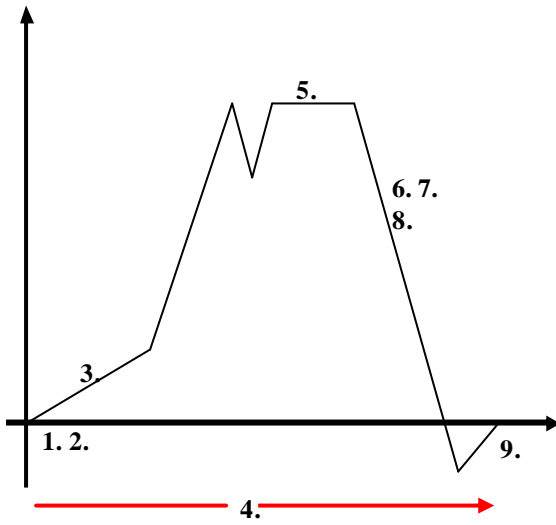
ADVANCED TROUBLE SHOOTING

This section concerns advanced trouble shooting. The different sub-sections below follow on from the previous section **START TROUBLE SHOOTING**. This means that all trouble shooting starts there.

Flow chart



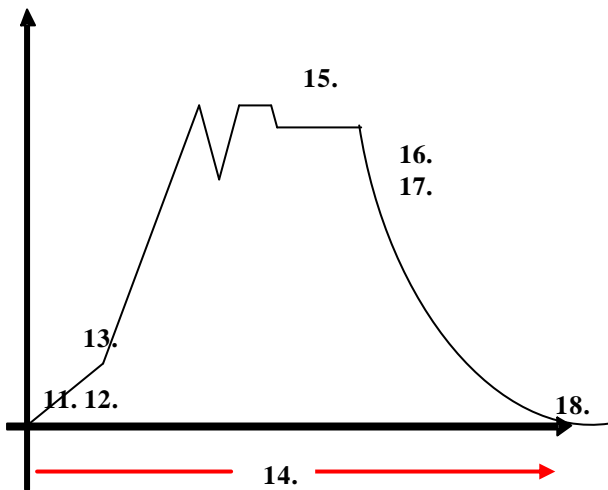
Process description



Steam is generated in the sterilizer through an external water feed that may be preceded by a softening filter.

Condensation is led off to the drain.

1. The door gasket is pressurized by MV-5 opening and releasing water into the gasket groove.
2. The sterilizer is filled with water until the level guard cuts in.
3. The heater heats the water and the pressure rises.
4. The steam pressure is monitored by the pressure sensor which, via a PID-regulator, controls the heater.
5. The temperature of the steam is monitored by the pressure sensor (through a theoretical calculation).
6. The solenoid valve MV-1 is used to empty the water from the chamber.
7. The steam pressure is released via MV1 and MV6
8. The water pressure powers an ejector, which creates an underpressure in order to lower the chamber pressure below atmospheric pressure. MV4 releases the water pressure on the ejector.
9. MV-2 is used to release the air in the chamber.
10. MV-8 releases the door gasket's water pressure. The door can now be opened.



LIQUID LOAD

11. The door gasket is pressurised.
12. The sterilizer is filled with water until the level guard cuts in.
13. The heater heats the water and the pressure rises.
14. The steam pressure is monitored by the pressure sensor which, via a PID-regulator, controls the heater.
15. The load sensor monitors the temperature of the liquid to be sterilised. The load sensor temperature determines when the sterilizer switches to sterilisation.
16. The solenoid valve MV-1 is used to empty the water from the chamber.
17. The steam pressure is released via MV1 and MV6 through ramping to prevent decoction.
18. When the liquid reaches a temperature below 95°C (controlled by the load sensor) MV-8 releases the gasket pressure and the door can be opened. The process is complete.

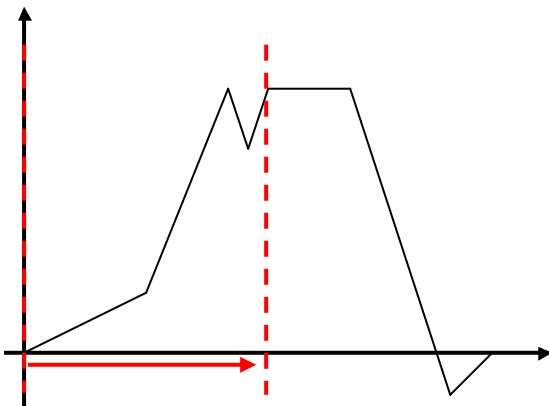
PRE-TREATMENT

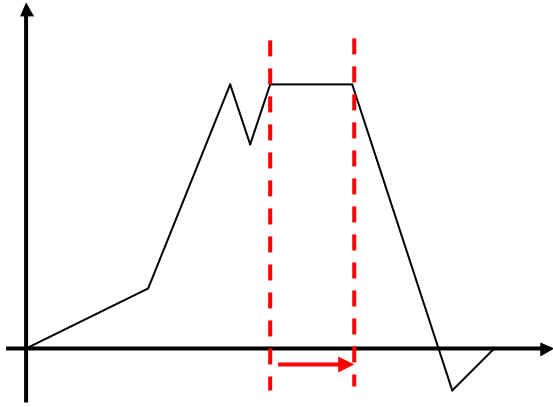
The purpose of pre-treatment is to remove air from the chamber and from the goods. Air prevents the requisite contact between the steam and micro-organisms to be killed.

Pre-treatment consists of steam injection and evacuation pulses in different processes depending on the program selected. In addition, the humidification essential to killing mainly takes place during the pre-treatment stage.

Pre-treatment process:

- Blow through (1)
MV-1 opens, the chamber is filled with water and the heater then heats the water. MV-6 opens during the preset time.
- Pressure increases (2)
MV-6 closes and the heater heats. The pressure rises to a preset level. The sterilisation pressure should be reached during the final increase in pressure. Sterilisation begins when the sterilisation pressure is reached.





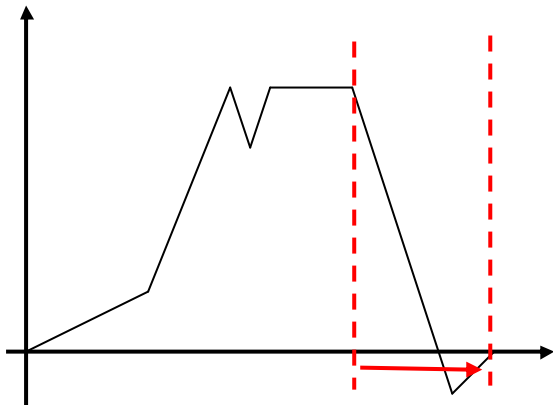
STERILISATION

Sterilisation takes place by maintaining the saturated steam's relation (boiling point at a specific pressure).

The sterilisation phase is in progress during a pre-programmed number of minutes at the preselected temperature/pressure.

Sterilisation process:

- MV-6 opens during the preset time intervals.
- The pressure is controlled by means of the heater, which heats as required.



POST TREATMENT

The purpose of post treatment is to reduce the moisture content in the goods. During post treatment the pressure drops to atmospheric pressure or lower – depending on the selected program. Post treatment is completed by air being drawn in until the chamber is at atmospheric pressure.

Post treatment process:

- MV-1 opens and releases the remaining water.
- MV-4 opens and the ejector starts.
- MV-6 opens after an additional few of minutes.
- When the right vacuum is reached (800 mBar) time metering starts.
- When the time elapses MV-1, MV-4 and MV-6 close. MV-2 opens and air is drawn in and the pressure rises towards atmospheric pressure. MV-8 opens and the door gasket pressure is released. The process is finished.

PROCESS DESCRIPTION - LIQUID LOAD

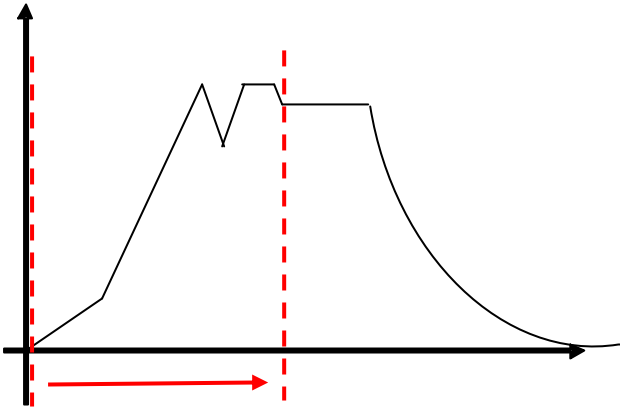
PRE-TREATMENT

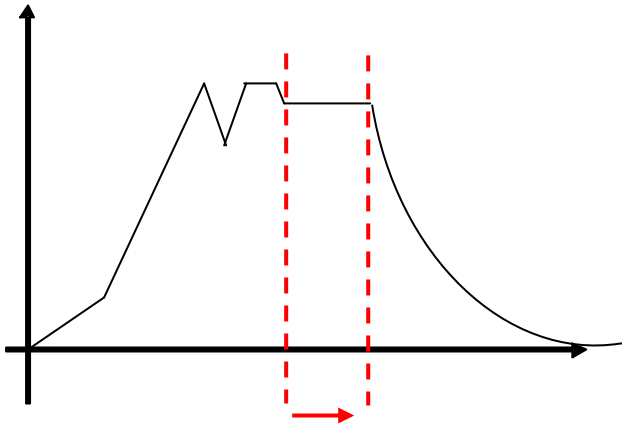
The purpose of pre-treatment is to remove air from the chamber and from the goods. Air prevents the requisite contact between the steam and micro-organisms to be killed.

Pre-treatment consists of steam injection and evacuation pulses in different processes depending on the program selected. In addition, the humidification essential to killing mainly takes place during the pre-treatment stage.

Pre-treatment process:

- Blow through (1)
MV-1 opens, the chamber is filled with water and the heater then heats the water. MV-6 opens during the preset time.
- Pressure increases
MV-6 closes and the heater heats. The pressure rises to a preset level just above the sterilisation pressure to accelerate the heating of the liquid. When the load sensor temperature approaches the sterilisation temperature, the steam pressure drops to the sterilisation pressure. Sterilisation starts.





STERILISATION

Sterilisation takes place by maintaining the saturated steam's relation (boiling point at a specific pressure).

The sterilisation phase is in progress during a pre-programmed number of minutes at the preselected temperature/pressure. The load sensor monitors the temperature of the liquid.

Sterilisation process:

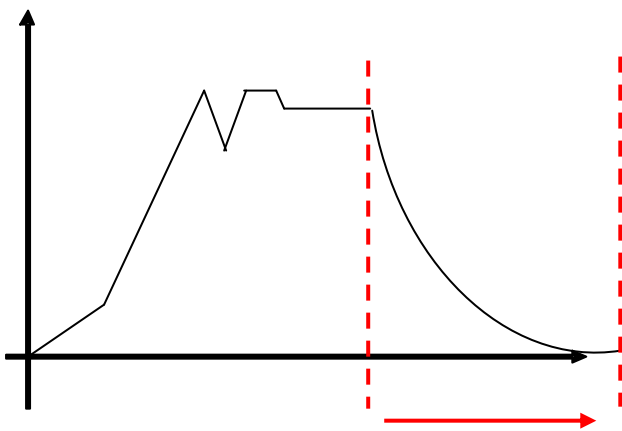
- MV-6 opens during the preset time intervals.
- The pressure is controlled by means of the heater, which heats as required.

POST TREATMENT

The purpose of post treatment is to lower the temperature of the liquid below boiling point at atmospheric pressure.

Post treatment process:

- MV-4 opens and the ejector starts.
- MV-1 opens at the preset time intervals to ensure a slow pressure decrease and prevent decoction of the liquid. The remaining process water is released in connection with ramping.
- When atmospheric pressure is reached and the temperature of the liquid (controlled by the load sensor) is below 95°C, MV-1 and MV-4 close. MV-2 opens and the atmosphere in the chamber and the atmosphere in the room are kept at the same level. MV-8 opens and the door gasket pressure is released. The process is finished.



**IMPORTANT!**

Trouble shooting takes place:

- At overpressure
Follow the method prescribed in **Check component, 2. Pipe/pipe couplings.**

**TIP!**

Check whether steam is let out with an overpressure.

- On cold components:
use soapy water
- On hot components
use a mirror

Trouble shooting leakage

- 1 Check for door leakage as set out in the section **Check component, 20. Door.**
- 2 Check for leakage from the pressure relief valve as set out in the section **Check component, 16. Pressure relief valve.**
- 3 Check for leakage from the solenoid valves as set out in the section **Check component, 3. Solenoid valves.**
- 4 Check for leakage from the pipe couplings as set out in the section **Check component 2. Pipe/pipe couplings.**
- 5 Check for leakage on the temperature sensor's lead-throughs as set out in the section **Check component, 15. Load temperature sensor.**
- 6 Check for leakage from the ejector as set out in the section **Check component, 13. Ejector.**

Calibration instruction

- 1 Connect a calibrated test pressure gauge to the connection labelled **PT** on the sterilizer.
- 2 Start a 134°C program.
- 3 Let the program run to post treatment
- 4 When the vacuum has stabilized, calibrate the B parameter for the pressure sensor.
- 5 Check that the external pressure gauge shows the same pressure as on the sterilizer's display.
- 6 Allow the sterilizer to finish.
- 7 Start a new 134°C program. Let the program run to "sterilisation". Calibrate the A parameter for the load sensor. Check that the external pressure gauge shows the same pressure as on the sterilizer's display.
- 8 The sterilizer will calculate the theoretical sterile temperature, based on the calibrated pressure values.
- 9 Allow the program to finish. Check the vacuum setting during the post vacuum phase.

MENU NAVIGATION

Orientation



Navigation through the menus is done using the four arrow keys **UP arrow**, **DOWN arrow**, **LEFT arrow**, **RIGHT arrow** and the **ENTER key**.

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the left arrow when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.

When a menu selection has been activated, one of two actions can be performed.

- When the selection is a new menu position, a further selection can be made.
- When the value can be edited, use the arrow keys as set out above.

The selection can either be shown on one or two rows. When one row is shown, this means the row can be selected and activated using the **ENTER key**. When two rows are shown, the first row shows the selected name and the second row the value linked to the selection.



TIP!

You can return at anytime to the main menu by pressing the left key and holding it down for 4 seconds.

Edit values

Press the **ENTER key** to set the display in edit mode, i.e. make the selected value editable. The cursor is positioned to the far left below the first character when the value is selectable.

EDIT PRESET VALUES

Use the **UP arrow** and **DOWN arrow** to change a value. Different values are shown each time the arrow key is pressed.

Save the value by pressing the **ENTER key**.

EDITING NUMERICAL VALUES

The value can consist of several characters. The character with the cursor below can be edited.

The highlighted character can be increased or decreased by using the **UP arrow** or **DOWN arrow**.

Use the **RIGHT arrow** or **LEFT arrow** to select the next editable character to the right respective left.

When you have finished, save the values by pressing the **ENTER key**.



TIP!

When adjusting the sterile or post vacuum times, the value can not be set below the preset value.

THE MENU TREE

Main menus

Main selection: Program name, Program version, Phase, Cycle counter and Setup menu.

Password service 120416

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the **LEFT arrow** when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.

1. PROGRAM NAME

Program name: Selected program

Params 1 Params 2: Sterilisation time & temp (or Heating up)

Select program: Sub-menu to selected program. Important, the sterilizer has a **PROGRAM SELECTOR button** for this on the front.

Change parameter: Possibility to change the sterile time and post vacuum time. Password 558

2. PROGRAM VERSION

E.g. 050121

3. PHASE

E.g. PRE-TREATMENT

4. CYCLE COUNTER

Possibility to read the sterilizer's counter, pressure and temperatures. E.g. 0210

Setup menu

5. SETUP MENU

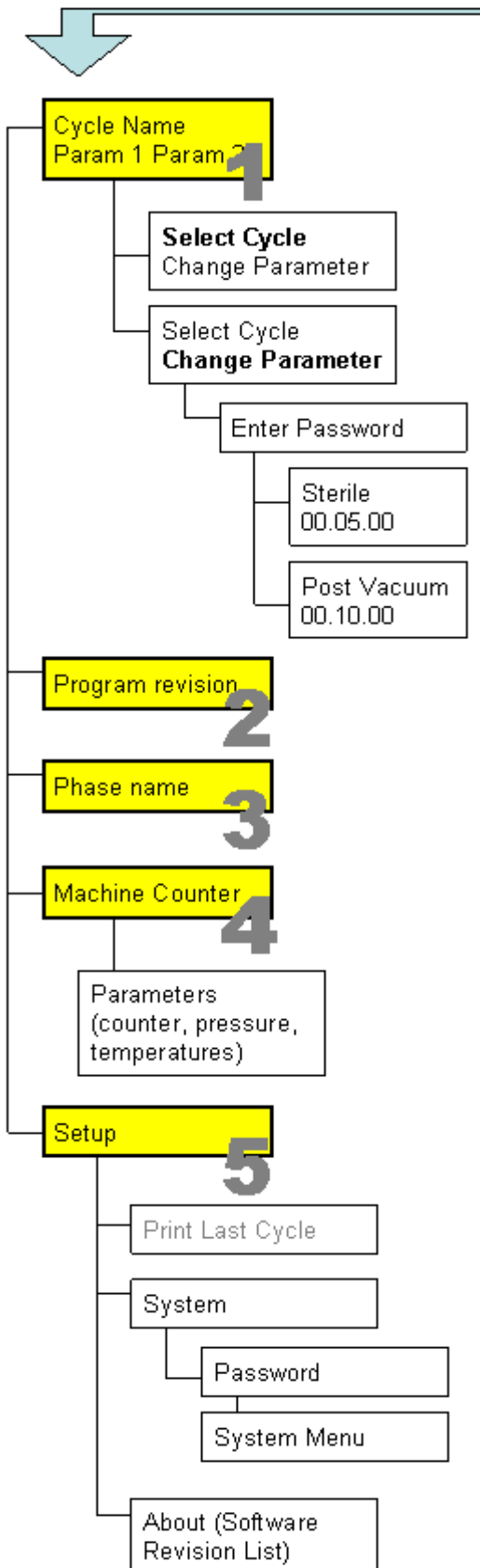
Print Last Cycle: Not used.

System: To access the System menu.

Password: State

System menu: See the section System menu.

About: Software version



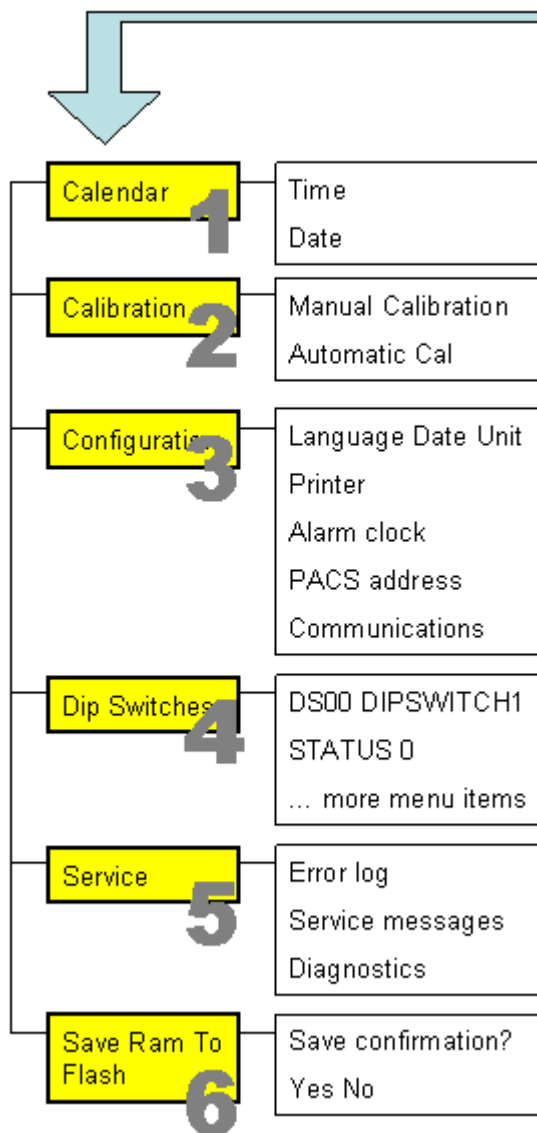
System menu

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the **LEFT arrow** when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.

**The sterilizer's menu for installation specific settings and unique machine settings.
Main selection: Calendar, Calibration, configuration, Dipswitch, Service and Flash memory.**



1. CALENDAR MENU

Time and date settings

2. CALIBRATION MENU

Only possible with manual calibration
See separate section **Calibration menu**

3. CONFIGURATION MENU

See separate section **Configuration menu**

4. DIPSWITCH MENU

Not used.

5. SERVICE MENU

See separate section **Service menu**

6. FLASH MEMORY MENU

Save adjustments and changes to the flash memory.
Should always be done once adjustments and calibrations have been made.

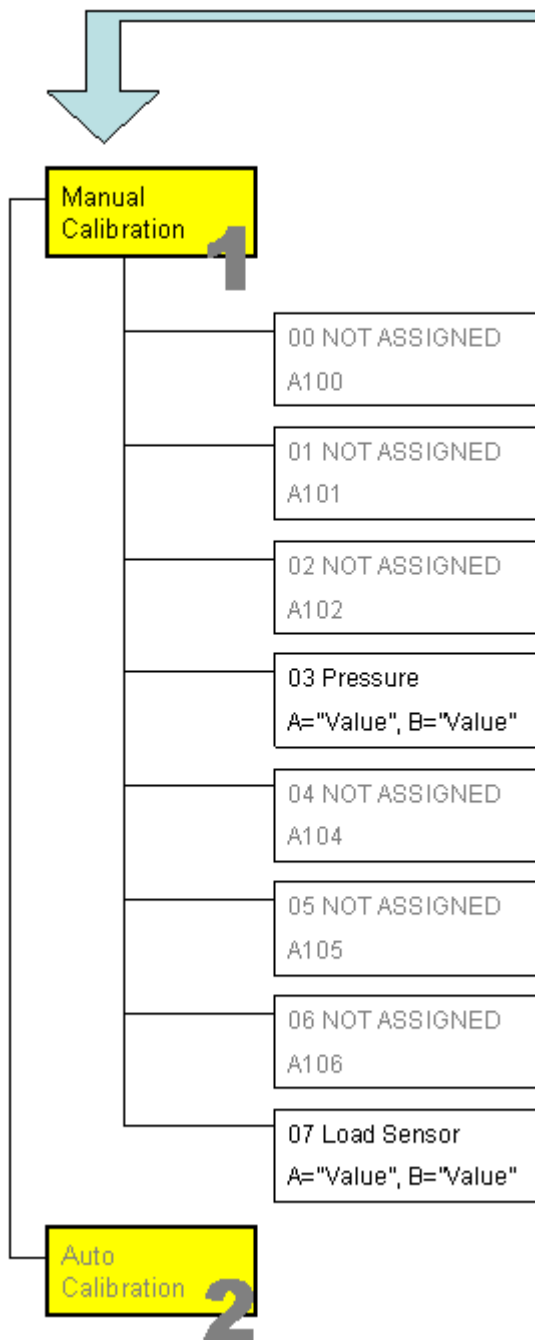
Calibration menu

Main selection: Manual calibration, Automatic calibration and Compensation table.

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the **LEFT arrow** when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.



1. MANUAL CALIBRATION

Always use MANUAL CALIBRATION. To calibrate, see the section **Advanced trouble shooting, Calibration**

00 Not used

01 Not used

02 Not used

03 Pressure: Step the cursor to each value to be changed. Verify with Enter

04 Not used

05 Not used

06 Not used

07 Load sensor: Step the cursor to each value to be changed. Verify with Enter

2. AUTOMATIC CALIBRATION

Not used

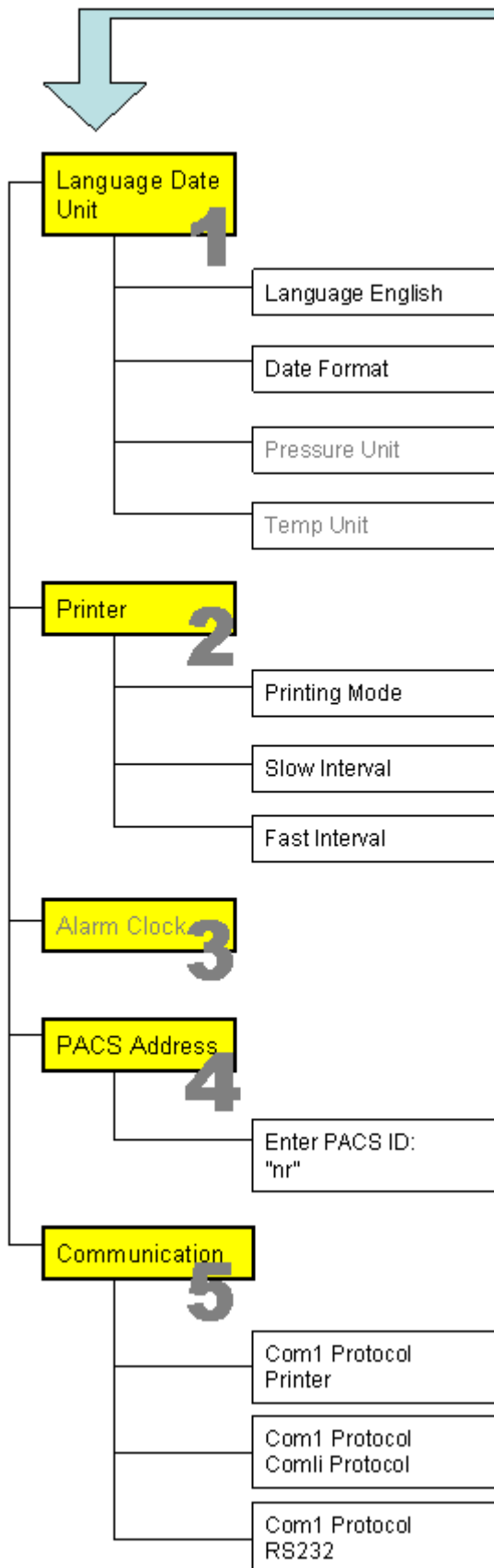
Configuration menu

Main selection: Calendar, Calibration, configuration, Dipswitch, Service and Flash memory.

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the **LEFT arrow** when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.



1. LANGUAGE DATE UNIT

Settings related to countries

Language setting: Display language

Date format

Pressure format: NOTE! Must not be changed! The sterilizer is calibrated based on bar.

Temperature format: NOTE! Must not be changed! The sterilizer is calibrated base don degrees Celsius.

2. PRINTER

Printing Mode: Not used.

Logging interval low: Logging interval for the total process excluding the sterilisation phase.

Logging interval high: Logging interval for the sterilisation phase only.

3. ALARM CLOCK

Not used

4. PACS ADDRESS

Possibility to give the sterilizer an Id. When there is more than on sterilizer with the printer in the same location. 1-99

5. COMMUNICATION

Settings for the Com-ports (3) RS232 or RS485

Set for communication with the service software.

Must not be changed!

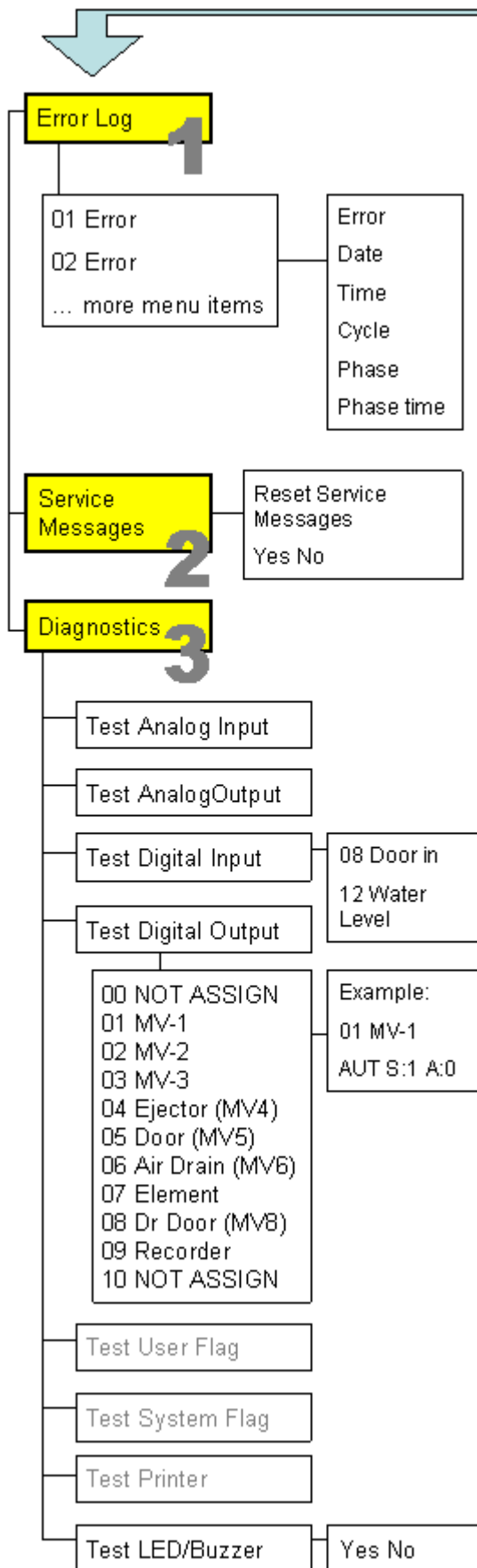
Service menu

Main selection: Error log, Service messages and Diagnostics.

Navigate to your choice using the **UP arrow** and **DOWN arrow**. The selection is indicated on the display by a cursor below the value to be changed.

To return to the previous level, press the **LEFT arrow** when the menu position is not selectable.

Press the **ENTER key** to activate your menu selection.



1. ERROR LOG

20 most recent error codes

The type of error code, in which phase of the program and when.

2. SERVICE MESSAGES

Resetting of the service alarm (alarm every 400 process)

3. DIAGNOSTICS

Manual test of components. Set the value under **MAN** and control with **S:1** or **S:0**

Analog input: Shows the water, pressure and temperature values

Analog output: Not used.

Digital input: Shows the door switch and an external level switch

Digital output: Check of all components

Test User Flag: Not used

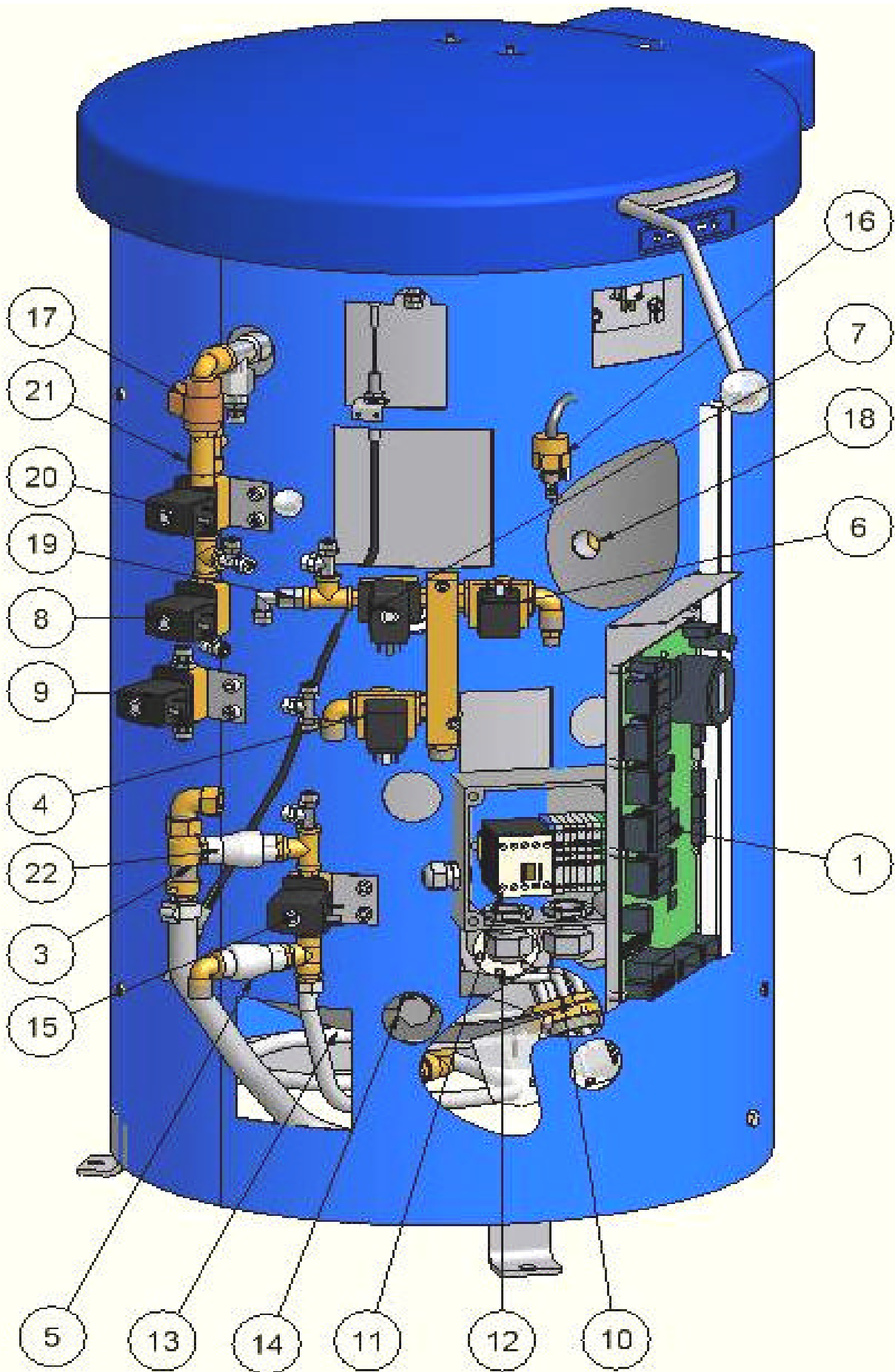
Test System Flag: Not used

Test Printer: Not used

Test LED/buzzer: Functional check of the sterilizer's audio signal and LEDs.

Component placement, internal

- 1 Circuit board
- 2
- 3 Ejector
- 4 Solenoid valve MV-3
- 5 Non return valve BV-1
- 6 Solenoid valve MV-4
- 7 Solenoid valve MV-5
- 8 Solenoid valve MV-6
- 9 Solenoid valve MV-8
- 10 Heater
- 11 Relay
- 12 Overheating protection, ÖV300
- 13 Chamber
- 14 Level guard
- 15 Solenoid valve MV-1
- 16 Absolute pressure sensor
- 17 Pressure relief valve (Chamber)
- 18 VT/PT-outlet
- 19 Pressure relief valve (Door gasket)
- 20 Solenoid valve MV-2
- 21 BV-2
- 22 BV-3

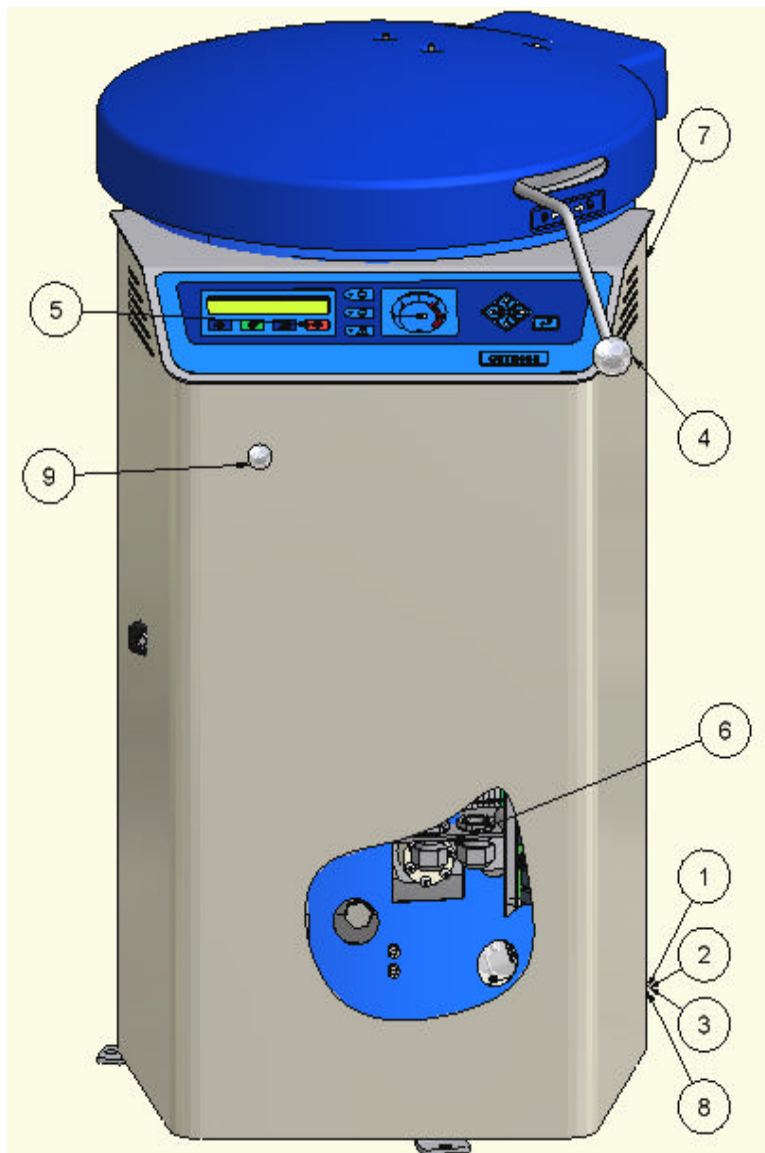


COMPONENT PLACEMENT, INTERNAL

COMPONENT PLACEMENT

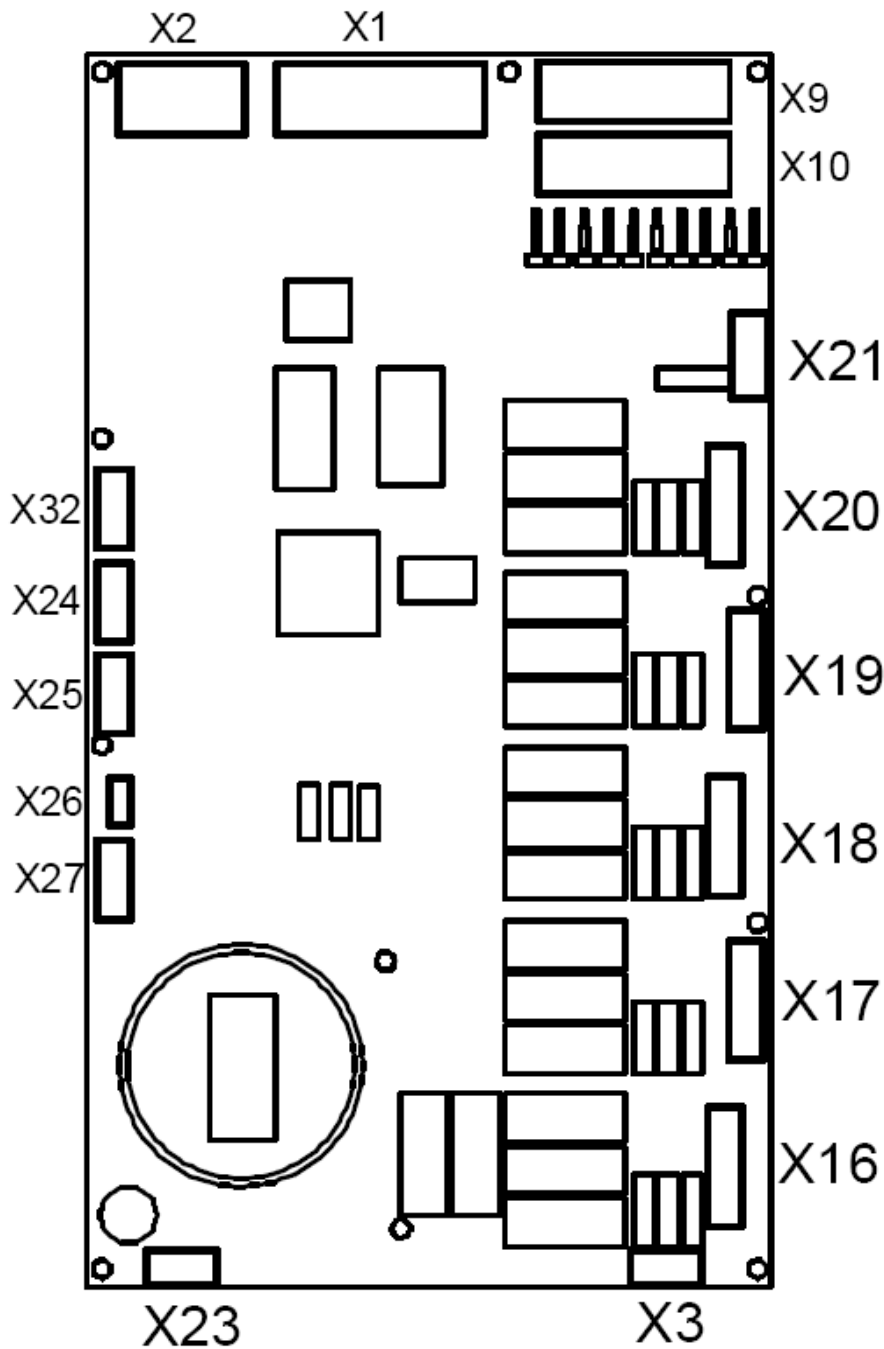
Component placement, outside

1. Water supply
2. Water connection
3. Water outlet
4. Handle
5. Control panel
6. Reset button, overheating protection
7. Printer port RS232 (accessory)
8. Mains supply
9. Door lock



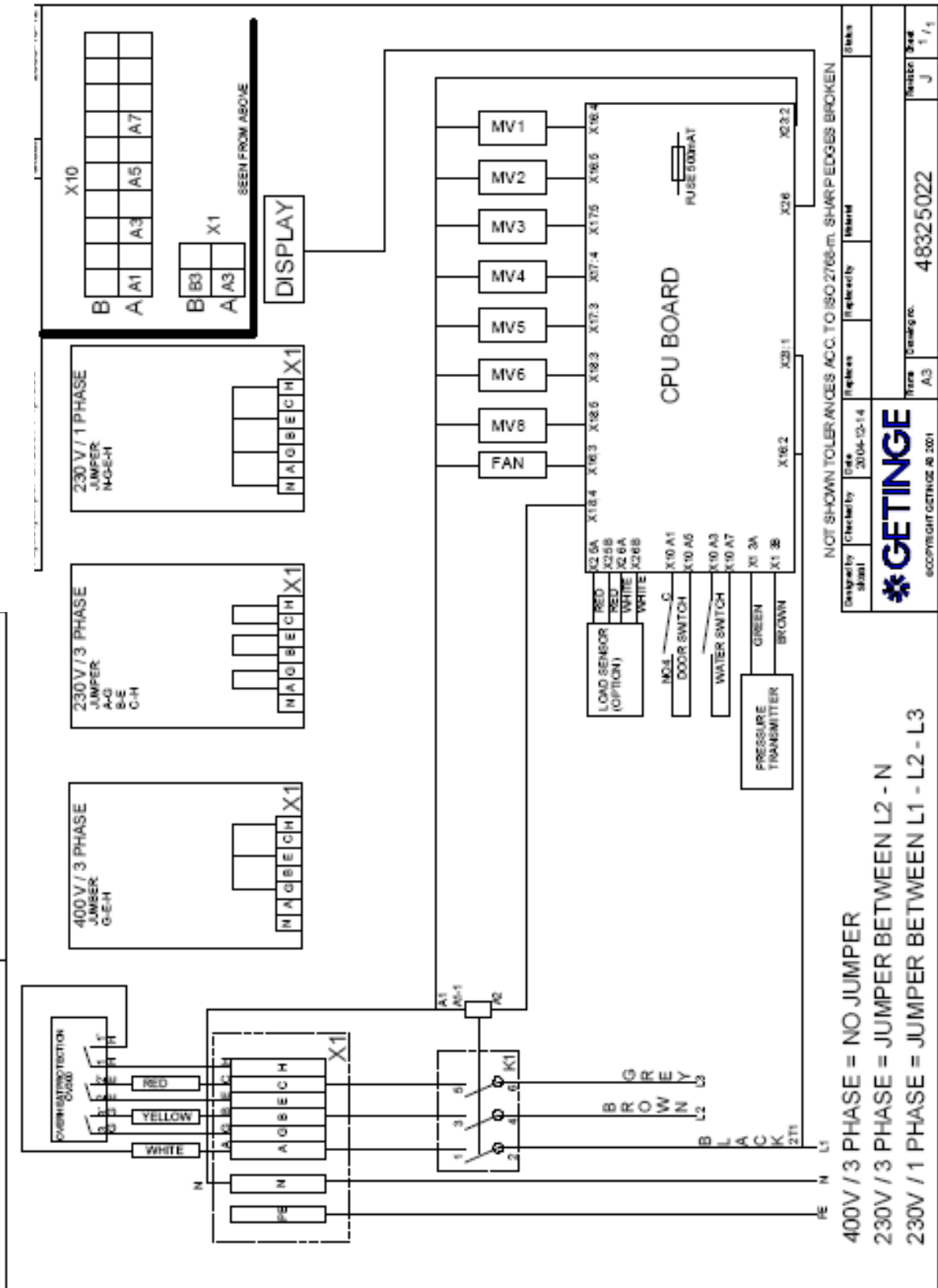
COMPONENT PLACEMENT, OUTSIDE

CIRCUIT BOARD DIAGRAM



X1	Absolute pressure sensor
X2	Temperature sensor
X3	
X9	
X10:A1	Switch (Door)
X10:A3	Level guard water
X16:2	L1 (Phase)
X16:3	Fan
X16:4	MV-1
X16:5	MV-2
X17:3	MV-5
X17:4	MV-4
X17:5	MV-3
X18:3	MV-6
X18:4	Relay (Heater)
X18:5	MV-8
X19:4	Recorder
X20	
X21	
X23	
X23:1	L1 (Phase)
X23:2	Neutral
X24	PC communication
X25	
X26	Display
X27	
X32	

WIRING DIAGRAM



Quantity	Checklist	Date	Replaces	Revised by	Issued	Status
		2004-10-14				

GETINGE COPYRIGHT GETINGE AB 2001		Item	Quantity	Part No.
		A3	48325022	J

INSTALLATION

**CAUTION!**

Installation must be carried by technicians with documented experience.

**WARNING!**

Make sure that the area where the sterilizer is to be located can withstand a load of at least 250 kg.

**CAUTION!**

Ambient temperature, max 35 °C.
Ambient humidity, max 95 %.

INTERNAL TRANSPORT

The easiest method to move the sterilizer is using a pallet truck or a barrow with a minimum lifting limit of 120 kg.

UNPACKING

Check that the packaging is intact.

Check that the supplied goods correspond with the order.

Check that the sterilizer is free from defects.

Transport damage must be reported immediately to the carrier.

Setup

PREPARATIONS

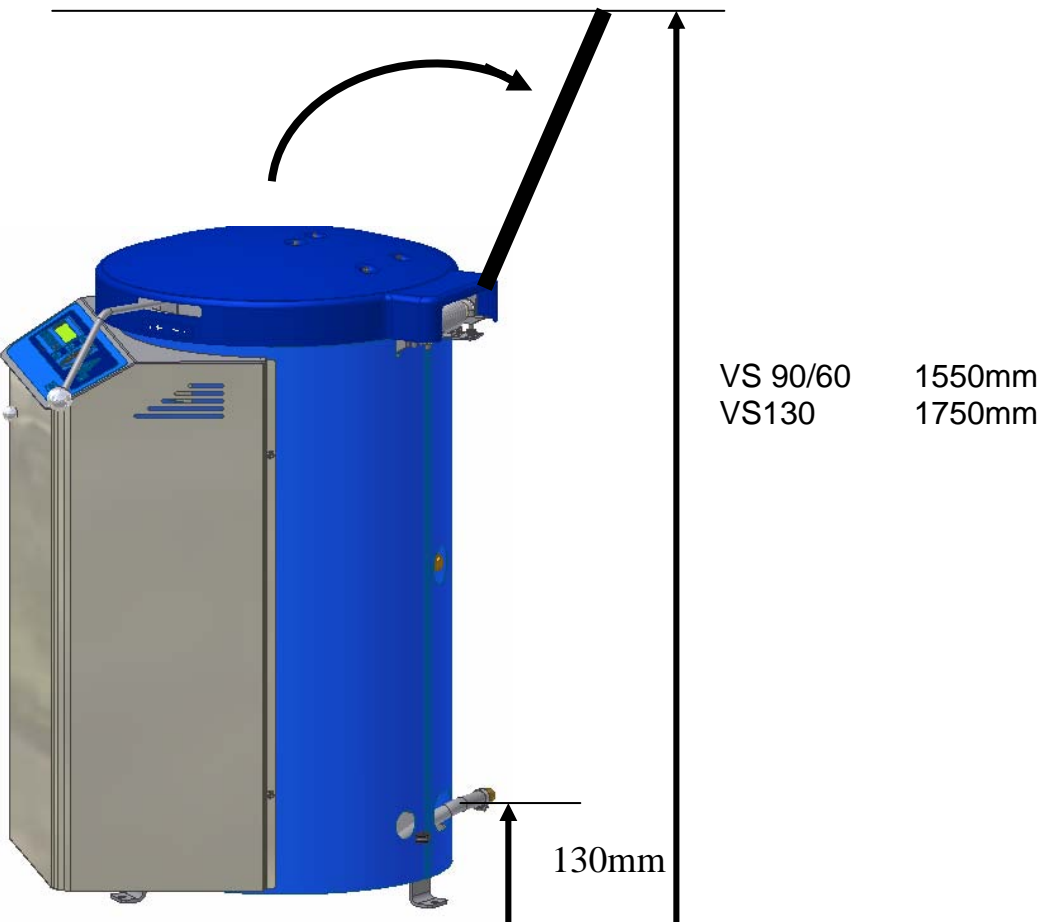
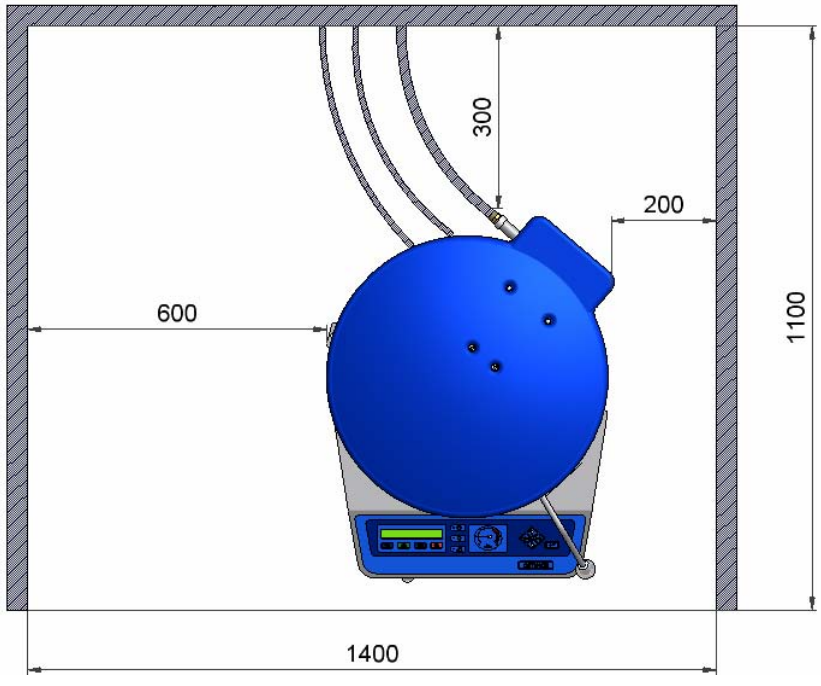
Setup ought to be carried out by technicians with documented experience.

The sterilizer must be located indoors with a maximum ambient temperature of 35 °C and a relative, no condensing, humidity of maximum 95 %.

PLACEMENT

The sterilizer is a floor model and must stand free, it must not be enclosed. It should be positioned so that loading and unloading can be performed without risk. It must be possible to open the door fully. See the recommended distances in the picture
Follow local safety regulations.

Once the placement of the sterilizer has been established, anchor the sterilizer to the floor by each of the three feet. This prevents the sterilizer from tipping. A 13 mm hole has been drilled in each foot. Use a screw and plug intended for the surface in question. Make sure there is a slight backward incline, i.e. the side of the door should be slightly lower than the front, about 2 - 3 mm. This is accomplished by placing a washer under each of the front feet.



Electrical connection



IMPORTANT!

The electrical connection of the unit must be carried out by trained personnel

Prior to carrying out any connection work, ensure that the characteristics stated on the nameplate correspond to the mains supply to which it is to be connected. In case of uncertainty as to the unit supply voltage,

VOLTAGE FLUCTUATION:

The electrical components tolerate a supply voltage fluctuation of between -10 and +10 %. For larger fluctuations, it is necessary to use a voltage stabilisation system placed between the circuit-breaker and the processor unit transformer. In this case, contact the sales office.

POWER-SURGE PROTECTION:

A power-surge protection device (over current protection) must be placed on the sterilizer's AC power supply. This protection is the responsibility of the customer.

CIRCUIT-BREAKER:

A device enabling the sterilizer to be electrically isolated must be inserted on all the live conductors (including neutral). This switch or circuit-breaker must be part of the building's electrical equipment, positioned near the unit, and must be easily accessible and marked as the power switch for the unit, while stating its function.

If the unit is connected in polyphase. Its characteristics are as follows:

- Breaking power 63 A breaking the 3 phases as well as neutral

Earth terminal making it possible to connect the isolating device to the earth conductor without braking it.

The on and off positions must be marked: **I** on and **O** off

- Box IP 54

TYPE-	Power (kW)	Voltage (V)	Current (A)
VS 60 - 130	6.1KW	230V Single phase	30A
VS 60 - 130	6.1KW	230X3V	20A
VS 60 - 130	6.1KW	400X3V + N	16A

Connect the sterilizer to the earth and according to the specification of the manual. The installation must be protected in accordance with the regulations in force. Failure to comply with this instruction may result in electrocution of the user and damage to the unit.

CONNECTION POWER SUPPLY

Open the front box.



CAUTION!

The sterilizer must be declared to your electricity supplier in case of a 230 single phase connection.



WARNING!

Never work with energized equipment.
The sterilizer must be earthed.

400V 3 phases connection

5-wire cable (3 phase + Neutral + earth)
No jumper

230V 3 phases connection

4-wire for 230V (3 phase (3 phase + earth)
Jumper between L2-N

230V single phase connection

3 wire (1phase + Neutral + earth).
Jumper between L1-L2-L3

With appropriate section to 60227 and 60245.

Pass the power cable through the rear housing provided for this purpose.

Connect the power cable earth connector to the terminal marked with the earth symbol

Connect the other end of the cable to the circuit-breaker/cut-off device located on the outside.

Change of voltage:

This adaptation requires certain parts to be changed; use the "Jumper kit" furnished with the machine to perform this change. For further information see the electrical diagram, or get in touch with the selling company.

Terminal connection:

Also see "Wiring diagram X1"

400 V 3 Phases Jumper between E-G-H

230 V 3 Phases Jumper between A-G, B-E, C-H

230 V Mono Phase Jumper between N-A-B-C

**CAUTION!**

The water supply must be fitted with a shutoff tap, as the sterilizer must not be left without supervision with the water pressurized.

**WARNING!**

Risk of hot water from the drain hose, exercise the greatest possible caution.

Water connection

The incoming water must have a pressure between 1.5 bar and 6 bar with a temperature of about 15 °C.
Water quality <4 dH

The sterilizer is connected to a ½" water connection with a shutoff tap. The sterilizer must not be connected with hoses less than 12 mm. The hoses supplied with the sterilizer are fitted with Gaz ½" G connections. The hoses (two) are labelled "Inlet" and "Drain".

The drain should be connected to a 6" cesspool, with a capacity of 10 litres/min that can withstand 100° C. Condensation can occur.

The drain hose must end at least 3 cm above the water surface in the well.

The drain hose must not go higher than to the lower edge of the chamber.

Diverse

Should the sterilizer be transported in temperatures below -5 °C, the overheating protection on the sterilizer may need to be reset. The error code **Heating error** when a process is started indicates a symptom for this.

Keep all instructions and description of operation close to the sterilizer.

Make sure the operator has read the User manual.

All other documentation supplied with the sterilizer must be looked after by the operator. The documentation shall be kept with the sterilizer until its service life comes to an end.

TECHNICAL DATA

Dimensions/weight

Width/Depth	570/700 mm
Height VS60/VS90/VS130	1030/1030/1230 mm
Load height VS60/VS90/VS130	940/940/1140 mm
Weight VS60/VS90/VS130	100/106/115 kg
Operating weight VS60/VS90/VS130	107/113/122 kg

Capacity

Chamber, diameter	444 mm
Chamber, depth VS60/VS90/VS130	384/590/858 mm
Chamber, volume VS60/VS90/VS130	60/90/130 L
Instrument load VS60/VS90/VS130	12/24/36 kg

Electrical specifications

Electrical connection	according to rating plate
Control voltage	according to rating plate
Total output	6 kW (3 x 2 kW)
Power consumption	5 A (3 x 400 V), 9 A (3 x 230 V)
Heat emission while operational, closed door	about 615 W
Heat emission in standby, open door	0 W

Other data

Chamber, calculation pressure	3.0 bar
Chamber, provisions	AFS 1999:4 (ÅKN 71), Isbest PED 97/23 EEC)
Chamber/door, material	EN 1.4404, AISI 316L
Water quality	Max 4dH
Water pressure	1.5 - 6 bar
Water and drainage connections	½"
Water consumption during steam phase	7 litres
Water consumption per process	75 - 100 litres
Sound level	less than 53 dB

Not intended for the USA market

FEEDBACK

Type designations, select

- ? VS60
- ? VS90
- ? VS130

Serial number:

Points of view, tips or criticism:

Getinge Skärhamn works continuously to improve its products.

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Thanks in advance.