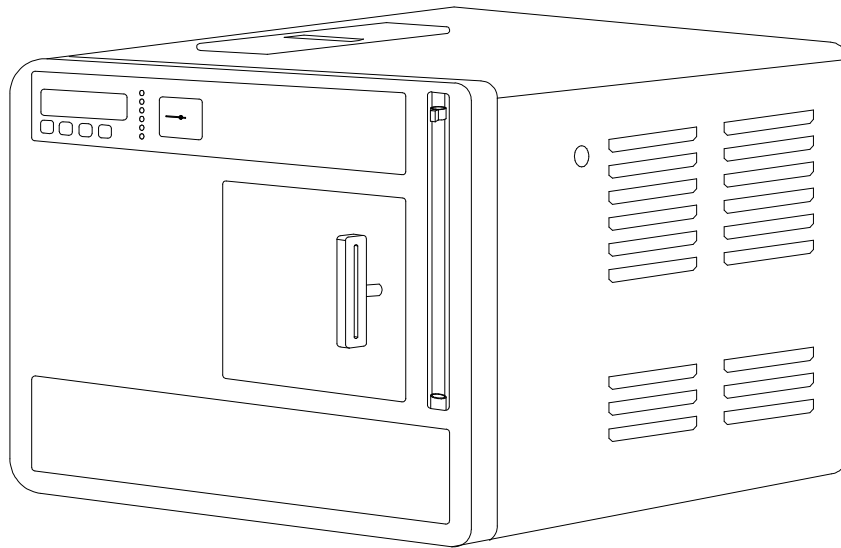


STERILIZER
GE224c VAC
Citomat 164 Vac
Manual



 **GETINGE**
— SKÄRHAMN AB —

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DECLARATION OF CONFORMITY ¹

Manufacturer ²

Name ³	Getinge Skärhamn AB
Adresse ⁴	Box19 S-47121 Skärhamn
Telefon ⁵	+46 0304 671020

Product ⁶

Machine reference ⁷	Sterilizer: GE 224c Vac / Citomat 164 Vac
Type number ¹³	978046101, 978046106, 978046103, 978046105

We declare under our sole responsibility that this product is in conformity with the following standards or standardization documents: ⁸

 SS-EN50081-1, SS-EN50081-2

 SS-EN50082-1, SS-EN50082-2

 SS-EN61010-1, SS-EN61010-2-041

 SS-EN60204-1

According to the provisions of the regulations: ⁹

 89 / 336 / EEC

 AFS 1994:39

 LVD 73 / 23 EEC

 MDD 93 /42 EEC (class IIa)

Place, date of issue ¹⁰

Skärhamn 980714

Position of issuer ¹¹

Managing director

Signatur of issuer ¹²

Managing director

Signatur of issuer ¹²

Name ³

Gert Linder

Translation of "DECLARATION OF CONFORMITY"

D	N	DK	P
NL-B 1. VERKLARING VAN OVEREENKOMST 2. Fabricant 3. Naam 4. Adres 5. Telf.nr. 6. Produkt 7. Machine type 8. Wij verklaren dat dit produkt voldoet aan de volgende normen of normatieve dokumenten 9. Volgens de bepalingen van de richtlijnen 10. Datum van afgifte 11. Functie 12. Handteekning	S 1. ÖVERENSKOMMELSEDEKLARATION 2. Tillverkare 3. Namn 4. Adress 5. Telefon 6. Produkt 7. Typbeteckning 8. Vi intygar och ansvarar för att denna produkt överensstämmer med följande normer och dokument. 9. Enligt bestämmelserna i direktiven 10. Datum 11. Titel 12. Signatur	F 1. DÉCLARATION DE CONFORMITÉ 2. Fabricant 3. Nom 4. Adresse 5. Telephone 6. Produit 7. Ref de la machina 8. Nous déclarons sous notre propre responsabilité que ce produit est en conformité avec les normes ou documents normalisés 9. Conformément aux termes des réglementations 10. Date 11. Fonction 12. Cachet et signature	
FIN 1. YHDENMUKAISUUSILMOITUS 2. Valmistaja 3. Nimi 4. Osoite 5. Puh 6. Tuote 7. Viite 8. Todistamme täten ja vastaamme yksin siitä, että tämä tuote on allaluelujenstandardien ja standardoimisasiakirjojenvaatiusten mukainen. 9. Seuraavien ohjeiden määräysten mukaisesti 10. Päivämäärä 11. Toimi yrityksessä 12. Allerkirjoitus	I 1. DICHIARAZIONE DI CONFORMITA 2. Produttore 3. Nome 4. Indirizzo 5. Telefono 6. Prodotto 7. Riterimento macchina 8. Assumendone la piena responsabilità, dichiariamo che il prodotto é conforme alle sequenti normative ed al relativi documenti. 9. In base alle prescrizioni delle directive. 10. Data di emissione 11. Qualifica del dichiarante 12. Firma del dichiarante	E 1. DECLARACIÓN DE CONFORMIDAD 2. fabricante 3. Nombre 4. Dirección 5. Telefono 6. Producto 7. Referencia de la machina 8. Declaramos bajo nuestra sola responsabilidad que este producto está en conformidad con las normas o documentos normalizados siguientes 9. De acuerdo con las regulaciones 10. Fecha 11. Cargo 12. Firma	

INTRODUCTION

Variants

These sterilizers are marketed under two brands which, apart from the names, are identical: Citomat is aimed primarily at the dental market and the GE versions primarily at the medical sector.

Sterilizers GE224c/Citomat 164 and GE224c VAC/Citomat 164 VAC are bench sterilizers which perform pre-programmed sterilization processes fully automatically.

Two versions of the sterilizer are available: the GE224c/Citomat 164 and the GE224c VAC/Citomat 164 VAC. The GE224c/Citomat 164 incorporates pulsed air removal and radiant post-drying, and is suitable for sterilization of thermally stable items such as those made of metal, glass, plastic and rubber.

The GE224c VAC/Citomat 164 VAC has, in addition, air removal and drying with vacuum, which means that it can also be used for sterilizing textiles, hollow instruments and packaged items.

General

Sterilizers GE224c/Citomat 164 and GE224c VAC/Citomat 164 VAC are bench sterilizers which perform pre-programmed sterilization processes fully automatically. The sterilizers use steam which is produced by a separate steam generator inside the unit. The steam generator is supplied with distilled or de-ionised water from an integral tank.



Warning

Very important text and warnings are marked with a double border like this.

- **The sterilizer operates with pressurised steam, so parts of the sterilizer may become hot. Always take great care when working with the sterilizer.**
- **Only clean the sterilizer when it is cold.**
- **The tank cover can become very hot during certain parts of the process.**
- **Never lift the tank cover when the safety valve is operated.**
- **Take care when emptying the tank; the water may be very hot.**
- **The items in the sterilizer will be hot after the sterilization process.**
- **When the door is opened, hot steam may flow out of the chamber.**
- **When handling and loading items, remember that the chamber and the door are very hot.**

Warranty

A one-year warranty is given on components, but not on components regarded as consumables, e.g. door packings. For servicing work, reference should be made to agreements with the supplier.

IMPORTANT: The warranty on the delivered product is invalidated by faulty installation.

The legal rules relating to manufacturer's liability only apply if the instructions in this manual have been followed

INSTALLATION

Internal transport

The simplest way of moving the sterilizer is to use a pallet truck or trolley, capable of carrying at least 110 kg.

Unpacking

Check that the product is undamaged. Notify any damage caused during transport immediately to the transport company. Check that the items received are in accordance with the order.

Setting up

Store the sterilizer indoors at a temperature between +2 °C and 40 °C and at a relative humidity not exceeding 95%, non-condensing.

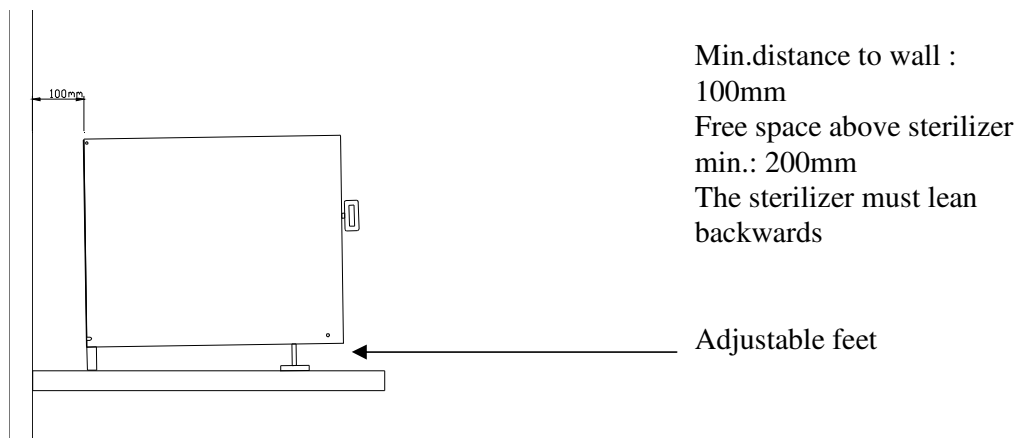
The sterilizer should preferably be installed by an authorised technician. There should not be a cupboard or shelf immediately above the sterilizer: it must be possible to fill and clean the water tank from the top of the unit without difficulty.

Position the sterilizer so that there is at least 10 cm free space all round it, in order to ensure the necessary air circulation.

The ambient temperature around the sterilizer should not exceed 35 °C.

It is most important for correct performance that the chamber should slope backwards.

- Place the sterilizer on a firm base, that will not be damaged by any unintentional water spills. The external dimensions of the unit are intended to fit on a normal worktop with a width of 600 mm.



- Make sure that the support surface can carry a load of at least 120 kg.
- Fit the door handle.
- Make sure that the sterilizer chamber slopes slightly backwards: adjust it using the front feet of the unit. If the surface of the water is parallel with the line in the tank, the slope is satisfactory.
- Set up the Care Instructions and Description of Operation near the sterilizer.
- Make sure that the operator has access to, and has read, the Description of Operation.
- Collect all other documentation supplied with the sterilizer, and ensure that it is available throughout the life of the sterilizer.
- Make sure that the technical documentation is available to the service technician.

- Check that there is a suitable power outlet in the vicinity of the sterilizer, and check that its voltage agrees with that shown on the sterilizer rating plate. The outlet must be earthed (grounded) and protected by a 10 A fuse.

Warning: Connection to an incorrect power supply may have lethal results.

- If the sterilizer has been transported at temperatures below -5 °C, it may be necessary to reset the overheat protection device. (See the section entitled Controls for the position of the reset pushbutton.) If the indicator lamp and display panel do not light up when the sterilizer is connected to the power supply, this may have happened.
- Fill the water tank with distilled water or de-ionised water (maximum 30 µS/cm) to the maximum mark (about 5 litres), from the de-ionisation equipment recommended by the sterilizer manufacture.

Warning: Putting the wrong liquids in the water tank can result in injury or other danger.

- Make sure that all operational and safety features have been checked by an authorised technician before the sterilizer is used.
- If the sterilizer has been unused for a long time, the tank may need to be filled with water the day before starting, to allow any air bubbles to disperse.

Commissioning / Validation

A document entitled “Points to be checked on installation” accompanies every sterilizer. Check each point and return the document to the supplier or dealer.

If the sterilizer is used for the re-sterilization of medical instruments, the sterilizer must be validated before being put to use. We recommend EN-554 as a model.

If a sterilized product is to be labeled with a CE-mark, the medical directive must be followed.

Indicators

If indicators are used to verify the process, we recommend those made by certified companies and fulfilling applicable standards.

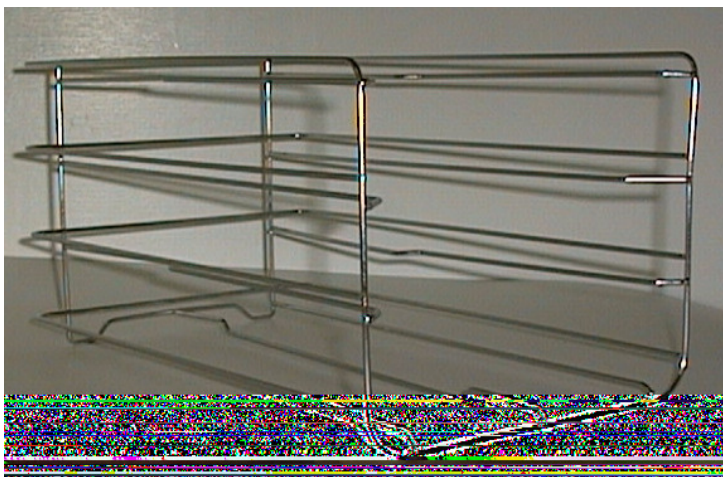
The following are used in the factory test runs.

Browne, Euro TST B & D type test pack 134° C / 3.5 min, for vacuum/steam
and the biological indicators used are of the following make:

Boule Nordic AB: Type B stearothermophilus art. no. 3014-s.

Racks

Do not use the sterilizer without the racks as illustrated below ’



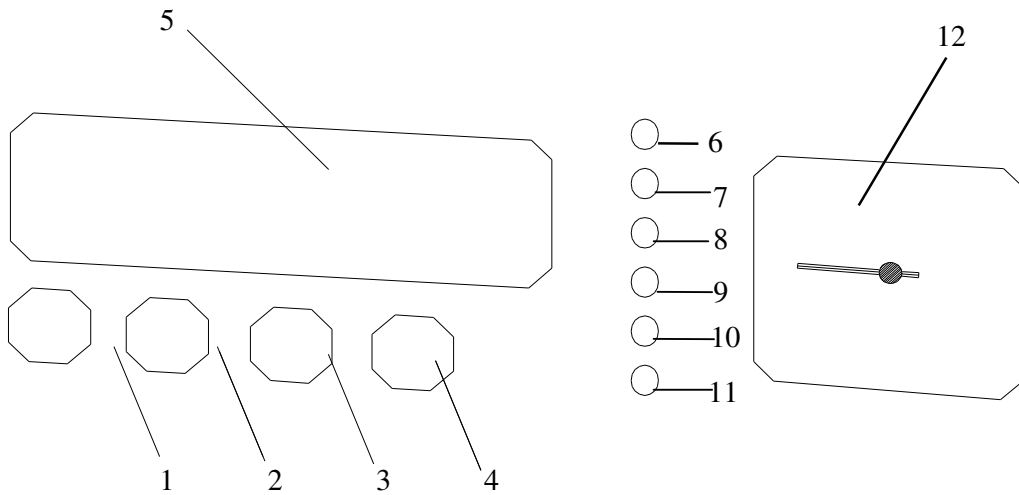
Nor with any accessories other than those supplied by Getinge Skärhamn AB.

Examples include:

Trays - instrument baskets -
tray handles - special
holders for bags (to improve
drying results) - de-
ionisation equipment -
recorder / printer.

Contact your dealer for
information.

STERILIZER CONTROLS



1 Membrane key

- Program selection

2 Membrane key

- Start

3 Membrane key

- Reset (to reset faults)

4 Membrane key

- Stop

5 Display unit

- See section headed "Display unit"

6-9 Indicator lamps - yellow

- Program indication

10 Indicating lamp - Green

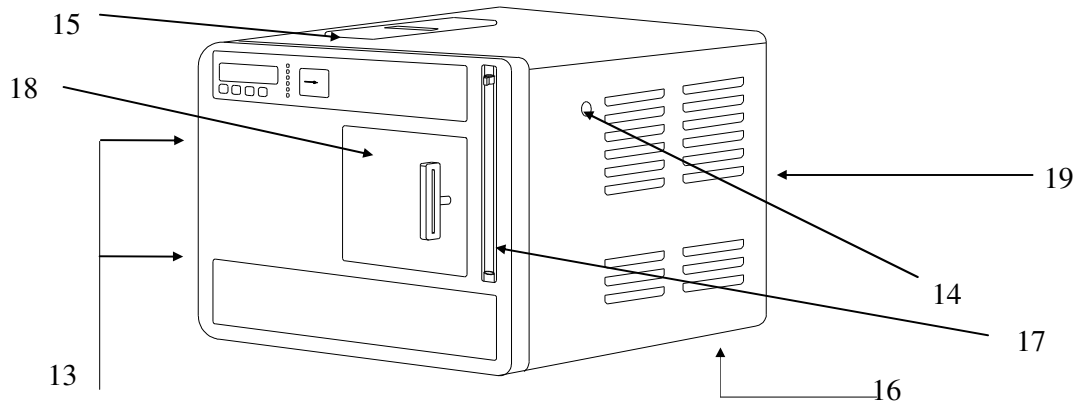
- Indicates "Processs Finished"

11 Indicating lamp - Red

- Indicates "Error"

12 Pressure gauge

- Shows the chamber pressure



13 Front panel retaining screws

- The panel opens to the right. Unscrew the fixing screws first.

External panels must not be removed by anyone other than an authorised technician.

14 Manual safety valve operator (easing gear)

- Operating this during sterilization phase opens the safety valve.

15 Tank cover

- Covers the water tank.

16 Reset pushbutton, overheating protection (underneath the unit, left-hand side)

- See under 'Installation/Setup'.

Never reset the overheating protection device without first removing the power plug from the electrical supply socket.

17 Level tube

- Shows the water level in the water tank.
- The level tube can be disconnected at the top and hinged forwards and downwards to empty the water tank.

18 Door handle

- For closing and locking the sliding door.
- Closing - using the handle, slide the door carefully to its right-hand end position.
- Locking - turn the handle 90° clockwise.

19 Main on/off switch, fuses and connector

- On the rear left side of the unit.
- Fuses 2 x 10A (anti-surge).

DISPLAY

The sterilizer has a display which provides the user with information in the form of text.
The following information is shown on the display:

	Text on display	Explanation
1.	Heating up C<70°C SG<140°C	The sterilizer is heating up Chamber temp. Current temp. Steam generator.
2.	Select 0103 134°C Textile	Select program with "PROGR" Number of cycles run Current program. (Starting position between sterilization cycles)
3.	Close the door.	Prompt to close and lock the door (Operator has pressed start with door open)
During the process		
4.	2,1 134 13 Sterilization	Current pressure - Current temp.- Minutes after start Current sequence
After completion of the process		
5.	0,0 100 15 Finished	Current pressure - Current temp. Process time, min. Process is complete but door has not been opened.
6.	Fault codes	See "Malfunctions"

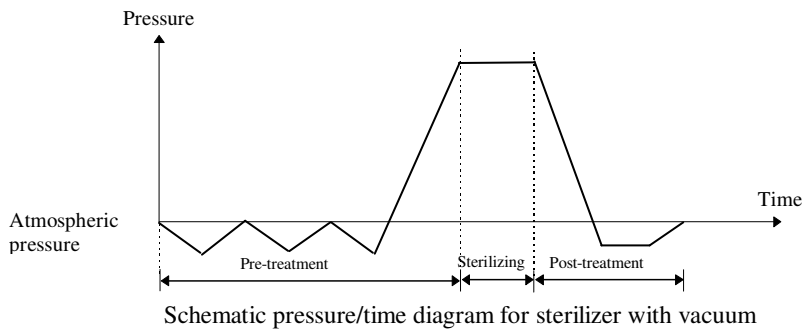
Incidental note concerning the indicated pressure after completion of the process:

As the pressure is measured by an absolute pressure sensor, the indicated pressure (when the door is closed and locked) is the current atmospheric pressure (ie a barometer). It is displayed until the door is opened.

DESCRIPTION OF THE PROCESS

The use of a microprocessor in the sterilizer means that it can offer a large number of program variations. The programs shown below are supplied as standard.

Parameter		Process			
		121 Wrapped	134 Flash	134 Wrapped	134 Textiles
Temperature	min °C	121	134	134	134
Pressure	min kPa	104	203	203	203
Sterilizing time	minutes	20	3.5	5	5
Total time empty chamber (approx)	minutes	33	7	18	23



The sterilizer may include further programs or modified programs, as described in its test records.

NB: The program times shown above are approximate, and may be altered if standards or other factors result in modified program sequences.

Flash program

The flash program must only be used for solid unwrapped instruments.

Note: Non wrapped sterilized instruments are either intended for immediate use in the same room where the sterilizer is placed, or for non sterile storage, transport and application (eg. to prevent cross infection)

Bowie & Dick Helix

In addition to the previous standard programs, the sterilizer is equipped with test programs for "Bowie & Dick" and the Helix test. This is indicated on the display when the program is selected. A flash program shall be run immediate before a B&D helix program.

THE STERILIZATION CYCLE

Type of material

The sterilizer has programmes for treating heat-stable materials such as metal, glass, plastic and rubber, unpacked or packed in paper or paper/plastic bags. The packaging material must comply with EN-868.

Heating

An unheated appliance is required. Turn on the power.

Technical: The element that preheats the steam generator and chamber is connected to the power supply. The display shows "Heating". The temperature of the heater can be followed on the display as soon as the temperature exceeds 150° on the heater. When the temperature reaches 240°, "Select" is shown on the display and the sterilizer is ready to start.

Pre-treatment

The pre-treatment part of the cycle purges the air from the sterilization chamber and the items in it. The air obstructs the necessary contact between the steam and the micro-organisms to be killed.

The moistening that is crucial for eliminating the micro-organisms also takes place during the pre-treatment phase.

There may also be a preheating phase, the purpose of which is to raise the temperature of the items to be sterilized to a higher temperature before the real start of the pre-treatment phase. This reduces the quantity of condensate resulting from the subsequent admission of steam and thus, finally, drier items.

Technical: The pre-treatment consists of a) blowing-through when pump 1 and MV-1 are opened alternately for a particular time, b) pressure reductions when MV-1, fan and pump 2 are connected to the power supply to a pre-programmed value (e.g. -0.6 bar), c) pressure rise when pump 1 starts and runs to a pre-programmed value. The sterilization pressure must be reached in the last rise in pressure. When sterilization pressure and sterilization temperature have been achieved for temperature sensor T0, "sterilization" appears on the display.

Sterilization

It is during the sterilization phase that the micro-organisms are actually killed.

The sterilization phase lasts for a preset number of minutes at the preset temperature and pressure.

Technical: The sterilization phase continues for a pre-set number of minutes at pre-set temperature/pressure. The pressure is regulated using pump 1, which is started as required.

Post-treatment

The purpose of post-treatment is to reduce the moisture content of the items being sterilized.

During post-treatment, the pressure falls to atmospheric pressure or lower, depending on which program was selected.

Most programs in sterilizers with vacuum function have a "vacuum phase", in order to reduce the boiling point of the residual condensate, thus leaving the items drier.

At the end of the vacuum phase, air is drawn in through a sterile filter until the chamber reaches atmospheric pressure.

Technical: MV-1, fan and pump 2 are connected to the power supply. When the pressure reaches the pre-programmed value, a clock is started. When the time has elapsed, MV-1 closes and MV-2 opens, air being drawn in via the air filter and the pressure rising towards atmospheric pressure.

OPERATING INSTRUCTIONS

Preparations from cold (all lamps unlit)

- Check that the tank is filled with water to the maximum level. When filling, use only distilled water or de-ionised water (maximum 30 μ S/cm).
- Start pre-heating the sterilizer by connecting it to the mains power supply in accordance with the Installation instructions. The following indications appear:
- “Heating up” on the display.
- After about 45 minutes, when the sterilizer has reached operating temperature the word 'Select' will appear on the display.
- If the sterilizer has been turned off, start a flash-program without material.

Sterilization

Carefully follow suppliers' instructions for all items to be sterilized.

Sterilize only items that are intended to be steam-sterilized, and so can withstand at least 125 C.

- Check of the level tube, that the water level in the tank is not below the minimum level.
 - The goods must be completely dry when loaded into the chamber.
 - When closing the door, make sure that nothing (e.g. bags etc.) is caught between the door and the chamber. If this is the case, operational problems will occur.
 - Items to be sterilized must be freely exposed; in other words, instruments and packages must not be piled on top of each other.
 - If a particularly heavy load is being run, the textile programme is recommended
 - When sterilizing lubricated dental hand pieces, wrap them in a paper towel which will absorb any excess oil.
1. Place moisture-sensitive items and low-mass items at the top of the chamber.
 2. Place heavy items at the bottom of the chamber.
 3. Place bowl-shaped items so that the hollow part is facing downwards.
 4. Place empty containers (bottles, test tubes etc.) with their opening downwards.
 5. Position bags vertically, to assist run-off of condensate. This makes it more likely that the items will be dry on conclusion of the process.
 6. Choose the required sterilization program with the membrane key “PROGR”. The display shows text to indicate the program that has been selected.
 7. Close the door and turn the handle 90° clockwise to the locked position, i.e. horizontal.
 8. Let the items rest in the chamber for a few minutes before starting the process. This warms them up, so that less condensate is formed, and the items are drier at the end of the process.
- Press the membrane key “START” to start, the yellow indicator lamp for required program lights up and the sterilization process will then proceed fully automatically.
 - The process is complete when the display shows 'Finished', the green indicator lamp lights up and the pressure gauge shows zero.

**The display never shows “Finished” if the process has been interrupted.
If the display is not showing “Finished”, items in the chamber may have been put there by someone else, and not yet been sterilized.**

- The goods will get drier if they are left in the sterilizer chamber for a few minutes with the door slightly open.
- As soon as the door is opened, the 'Finished' message disappears from the display.
- If the red indicator lamp is lit after a sterilization process, the items must be regarded as non-sterile and must be re-sterilized.
- Opening the door causes 'Finished' to disappear from the display and be replaced by 'Heating' or 'Select', depending on the temperature of the steam generator and the chamber
- If you need to stop the process, press the membrane key “STOP”. The red indicator lamp lights up and the display shows fault code 030 “Process stopped”; see under “Process interrupted.”
- Then press the membrane key “RESET” and wait for the pressure gauge to show zero.

Between sterilizations

- Close the sterilizer door, but do not turn the handle.

Be sure to remove all items from the sterilizer chamber as soon as the sterilization process is finished.

Never leave items in the sterilizer chamber.

- The sterilizer works best when the water tank is filled to the max mark with distilled or de-ionised water.
- When using the 121°-program after a 134° program has been running. Choose 121°-program and wait at least 15 min before start.

Closing down for the day

Unless local routines state otherwise.

- Close the sterilizer door, but do not lock it.
- Leave the sterilizer connected to the electric power supply.

At least six hours before “periodic maintenance”:

- Leave the sterilizer door fully open, ie as far to the left as possible.
- Shut down the sterilizer by unplugging the mains plug from the socket; the indicator lamps go out and the sterilizer cools down. (See also under “Maintenance”)

MALFUNCTIONS

- Start by checking that the sterilizer is connected to the mains power supply.
- Check the main fuses. Shut down the sterilizer. The fuses are in a red box in the same unit as the main switch. Fuse rating: 10 A anti-surge.
- Check that the red indicator lamp is not lit.
- Check that the tank contains distilled or de-ionised water.
- Check that nothing is between the chamber and the door.
- Check that the display reads "Select".
- If the display is not lit, one of the overheating protection devices may have operated. Contact an authorised technician.

Fault codes

The display may show any of several fault codes. If a fault code appears, the red indicator lamp lights up as well. Items in the chamber must be regarded as non-sterile and must therefore be re-sterilized.

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

Fault code 040 Pressure error

Pressure outside pressure band during sterilisation time

Fault code 041 Temp. Error

Temperature outside temperature band during sterilisation time

Fault code 050 Program missing

Type of sterilizer does not correspond to the type of sterilizer programmed in the service program

Fault code 017 Time out

Max. temperature was not reached within time limit

Fault code 018 Time out

Min. pressure was not reached within time limit

Fault code 019 Time out

Max. pressure was not reached within time limit

Fault code 043 "Door open"

The safety switch for the door was operated during process.

Fault code 014 "Proc. interrupted"

A power failure interrupted the process.

Fault code 042 "Steam generator cold"

The sterilizer has been overloaded or left with the door open between sterilization operations.

Fault code 030 "Process stopped"

The process has been stopped with the membrane key "STOP" .

Fault code 070-074 "PT-100 error"

One of the temperature sensors is open circuit.
Contact an authorised technician.

Service / Spare parts

For service or spare parts, contact your dealer.

PROCESS INTERRUPTED

If the sterilizer stops during the programme, check the following:

That no material has become caught between the door and chamber.

That the water level in the tank is not too low.

That the sterilizer slopes to the rear in accordance with the installation instructions.

That the strainer in the bottom of the tank is not obstructed.

That the strainer inside the chamber is not obstructed.

That the sterilizer is set up so that there is at least 10 cm space all round it.

If a process in progress has to be interrupted

Press the membrane key "STOP", whereupon the message "Post-treatment" will appear on the display and a red lamp will light up.

Wait until the pressure gauge shows zero and the message "Process interrupted" appears on the display.

Press the membrane key "RESET", whereupon the red lamp will go out.

Open the door by turning the handle anticlockwise a quarter turn, but do not slide the door sideways until about a minute has passed.

N.B. There is a risk in connection with an interrupted process of steam streaming out of the chamber when the door is opened.

Stop / Alarm

If the sterilizer has stopped or if a red indicator lamp lights up while a process is progress, follow the procedure below in the sequence indicated:

- Alt.1** Press the membrane key "RESET" . The red indicator lamp goes out.
Operate the door switch by turning the handle anticlockwise. The display should show 'Heating up' or 'Select'. Turn the handle clockwise to the closed position. The sterilizer is now in its starting state.
- Alt.2** Disconnect the sterilizer from the electric power supply and reconnect it after about 20 seconds. The red lamp lights up and the display shows fault code 014 'Process interrupted'. Press the membrane key "RESET" The red indicator lamp goes out.
When the pressure gauge shows zero, open the door by turning the handle anticlockwise. Wait at least ten seconds before opening the door fully. The display shows 'Heating up' or 'Select'. The sterilizer is now in its starting state.
- Alt. 3** Disconnect the sterilizer from the electric power supply and reconnect it after about 20 seconds. Manually operate the safety valve release to return the pressure in the chamber to atmospheric pressure.
When the pressure gauge shows zero, open the door by turning the handle anticlockwise. Wait at least 10 seconds before fully opening the door.
Close the door, but do not turn the handle.
Reconnect the electric power supply. The red indicator lamp lights up and the display shows fault code 014 "Process interrupted".
Press the membrane key "RESET" . The red indicator lamp goes out. The display shows 'Heating up' or 'Select'. The sterilizer is now in its starting state.
Follow the instructions in the section entitled "Operating Instructions".
If the fault persist, call a technician.

SAFETY DEVICES

Each sterilizer incorporates components intended to ensure safety of operation and maintenance. These components have been specially selected, and therefore must not be replaced by other makes or types of devices unless approved by the manufacturer.

Door

The door is designed so that it cannot be opened without force if the pressure in the chamber exceeds +0.2 bar. If force is applied to open the door at this pressure, a reed relay will be operated to open the exhaust valve to discharge the steam in the chamber. If, despite this, the door is opened with force so quickly that steam escapes via the door opening, it will nevertheless be directed to the sides, behind the external cladding of the sterilizer and not scalding the operator.

Safety switch - door

This prevents the sterilizer from being started unless the door is correctly closed and secured.

Pressure vessel

The sterilizer chamber is a pressure vessel, designed and manufactured in accordance with pressure vessel standards and requirements, as issued by the competent authorities for this area. Compliance with the standards is checked and tested by the Swedish Pressure vessel authorities(SAQ).

Safety valve

The chamber is fitted with a safety valve, set at an appropriate opening pressure, and which also incorporates a manual device for operating the valve to check its performance and for use during maintenance.

Overheating protection

The steam generator and chamber are fitted with overheating protection devices.

Safety checking

- During the sterilization process, check that the door is sealing against the steam pressure.
- Check that the sterilizer cannot be started until the door is correctly closed
- Make sure that all personnel are aware of current pressure vessel standards, together with the associated obligations
- Make sure that all personnel understand all the warning notices.
- Check that the safety valve operates at a pressure of 2.7 bar.

MAINTENANCE

Maintenance requirements depend primarily on how heavily the sterilizer is used. This means that the frequency of maintenance operations may vary from case to case. The manufacturer recommends that, when the sterilizer is being used to full capacity, at least the following maintenance operations should be performed at the specified intervals:

Periodic cleaning every 50 cycles or at least once a month

Unplug the electric plug from the socket before cleaning the unit.

The equipment must only be cleaned when it is cold.

External covers must never be removed by anyone other than an authorised service technician..

- Drain the water from the tank by releasing the level tube at the top and tilting it forwards and downwards.
- Clean the strainer at the bottom of the tank.
- Fill the tank with distilled or de-ionised water to its maximum level.
- Remove the chamber insert. Clean the chamber internally using a damp cotton rag. Never use steel wool. Make sure that the strainer at the far end of the chamber, on the bottom at the right, is clean.
- Wipe down the outside of the sterilizer using a chlorine-free domestic cleaner.
- If the sterilizer is used for sterilizing lubricated dental hand pieces, the water in the tank must be changed every 20 cycles.

Monthly

To ensure that the safety valve is working properly, it must be regularly operated as follows:

- Start a sterilizing cycle and wait for the sterilization phase
- Operate the easing gear at the “Safety valve” sign, which is accessible from the outside.

Quarterly

- Check the sterilization performance of the sterilizer, using special bacteria samples under normal operating conditions..

Yearly

- The sterilizer must be serviced by an authorised technician.

YEARLY MAINTENANCE SERVICE

Serial no:.....Address:.....

- Replace the door gasket.
- Lubricate the moving parts of the door with a heat-resistant grease.
- Clean the rails on which the ball-bearings run.
- Fit a calibrated inspection pressure gauge, for measurement of absolute pressure, to the flange intended for it and check, when the sterilizer is in use, that the sterilizer's own pressure gauge is maintaining the required accuracy class.
- Using a calibrated thermo-instrument, check that the pre-heating temperature of the chamber is correct.
- Using a calibrated thermo-instrument, check that the steam generator is maintaining the correct operating temperature.
- While the external covering has been removed, inspect the unit for any leaks in pipe joints or instrument connections, and correct them if found.
- If necessary, perform any maintenance to be carried out by the operating personnel
- Check the performance of electrical components by using the Component Test feature in the service program.
- Run all programs.
- Replace the air filter, at least every 1500 cycles or once a year
- Check all safety features following point 1-6.

1. During the sterilization process, check that the door is sealing against the steam pressure.
2. Check that the sterilizer cannot be started until the door is correctly closed
3. Make sure that all personnel understand all the warning notices.
4. Check that the safety valve operates at a pressure of 2.7 bar.
5. If the sterilizer includes programs for the sterilization of liquids, make sure that personnel understand the risks associated with such applications.

Miscellaneous

Changed details:

Date:

_____ Sign: _____

To forfill the medical device a service according to above specification has to be made and signed by an authorized technician The document has to be archived at the users site until the sterilizer is taken out of use.

DESIGN OF THE STERILIZER

General

For flowchart, see Appendix 1

The sterilizer has a closed steam generating system; this means that evaporated water is condensed and returned to the water tank.

Pump P1 is a vibration-type pump which pumps the water from the tank to the steam generator, which turns the water into steam. The steam generator is supplied with distilled or de-ionised water from an integral tank. The temperature of the steam generator is proportionally controlled to 250 °C in service, by means of temperature sensor T4.

The temperature of the chamber walls is proportionally controlled to the set value by means of T1.

The pressure in the chamber rises when steam is supplied to it. The pressure is monitored by a pressure sensor which, via a PID regulator, controls the frequency of pump P1. The steam temperature is monitored by temperature sensor T0.

Solenoid valve MV1 is used to empty the chamber. The steam flows to the condenser where it is condensed with the aid of a cooler and a fan. The resulting water is returned to the water tank.

Pump P2 powers an ejector that creates a vacuum to reduce the pressure in the chamber below atmospheric pressure.

Solenoid valve MV2 admits air, filtered through the air filter, to the chamber.

Reference: (see X/Y) = Annex X / position Y

Components

**Use only insulated tools when doing any work that requires the equipment to be energised.
Remove the power supply plug from the socket when doing any other work.**

Solenoid valves

Noisy solenoid valves are trying to tell you something! The humming noise may be a warning of incipient overheating of the coil, due to an air gap in the magnetic circuit. This is often caused by dirt on the moving core, preventing it from closing properly when energised by the magnetic field from the winding. This creates a small air gap in the magnetic circuit, reducing the inductance of the coil and thus increasing the current through it.

- Deal with a humming solenoid valve by cleaning both the plunger and the cavity in which it runs.
- Always replace the O-ring between the coil and the casing after removing the coil.

Solenoid valve MV-1

This valve is fitted at the back of the sterilizer (see 6/1), and controls the evacuation of air and steam. It opens when it is energised, and is open when the sterilizer is in the standby state. The valve closes if the door is opened.

Solenoid valve MV-2

(see 6/24), This valve controls pressure equalisation after the post-vacuum phase. It is energised and open when the sterilizer is in the standby state. The valve closes if the door is opened.

Inlet nozzle to steam generator

This is fitted at the back of the steam generator. Inside the nozzle (see 6/4) there is a swirl outlet (see 6/2) and a strainer (see 6/3). The strainer and the hole at the front of the nozzle can easily become blocked if the sterilizer is not cleaned or is operated with water that is not de-ionised /distilled.

Checking:

This is done in the service program; see the relevant section. Select “Component test”, and activate “steam pump”. The pressure should rise to 2.7 bar, at which the safety valve should open.

Steam generator overheat protection, \ddot{O}_v300

The steam generator is protected against harmful temperatures above 300 °C by the \ddot{O}_v300 thermal cutout (see 6/5) which must be manually reset after it has operated. The reset pushbutton is accessible from outside the unit, and is fitted beneath the left-hand corner of the sterilizer. If the thermal cutout has operated, current to all components is cut off.

Chamber overheat protection, \ddot{O}_k200

This thermal overload cutout has a fixed operating temperature of 200 °C, and is fitted slightly above the centre of the left-hand side of the chamber (see 6/7). Its purpose is to prevent the overheating of the chamber heater or chamber. If it operates, it cuts off the electric power to all components.

General, regarding the overheat protectors

The chamber overheat cutout may operate because:

- the sterilizer has been transported at temperatures below freezing.
- of a fault in the temperature control of the steam generator / chamber preheating system.
- If the thermal cutout has operated as a result of excessive temperature, the sterilizer must be allowed to cool down for a while before the reset pushbutton will stay in.

When resetting the cutout, always pull out the plug from the supply socket.

Check:

Because of the undue thermal stress on the equipment, it is advisable to refrain from realistic checking of the operation of the chamber overheat protection.

Chamber pre-heating element

This element preheats the chamber to about 125 °C in 134 °C programs and 115 °C in 121°C programs. The element is rated at 900 W, so its resistance is about 60 Ω . (see 6/32)
ip-on ampmeter to check that the heaters are drawing current.

Steam generator elements

These preheat the steam generator to about 250 °C.

The element is rated at 900 W, so its resistance is about 60 Ω . (see 6/46)

Checking the elements:

These checks are part of the service program; see the relevant section. The check involves a “component test”, in which “chamber heat” or “heat 1” and then “heat 2” are activated. Use a clip-on ampmeter to check that the heaters are drawing current.

NOTE: The heaters deactivate after 20 seconds in the “component test”.

Pump 1

This pump supplies the steam generator with water from the tank via check valve (non-return valve) BV-1 and a spray nozzle fitted into the back of the steam generator heating block. The pump is a vibration pump (see 6/35) The frequency of its power supply is controlled by the control system.

Checking is done in the service program; see the relevant section. Select “Component test” and activate “steam pump”. The pressure in the chamber must rise to 2.7 bar, at which pressure the safety valve must open. The flow rate is 100-200 ml/min.

**Warning: Risk of scalding from discharged steam when the safety valve operates.
The cover of the water tank becomes hot when the safety valve operates or is operated.**

Pump 2

The purpose of this pump is to pump water from the tank through the ejector and then back to the tank, to produce a vacuum in the sterilizer. Pump 2 is a centrifugal pump (see 6/34).

Check the pump as part of the service program; see the relevant section. Select “Component test”, and activate “Ejector on” and “Valve 1”. If there is nothing wrong with BV1, the pressure should fall to at least -0.8 bar after about 15 minutes.

Check valve BV1

This check valve (non-return valve) is fitted immediately after the vibration pump (see 4/6) and prevents steam being forced backwards through Pump 1 to the water tank.

Check valve BV-2

This check valve (non-return valve) is fitted between the air filter and solenoid valve MV-2 (see 6/25) and prevents steam flowing through the filter in the event of a fault in solenoid valve MV-2.

Check valve BV-3

This valve is fitted between the cooler and the ejector (see 6/39) and prevents pressure equalisation after the post-vacuum phase by any route except through the filter at solenoid valve MV-2.

Air filter

The purpose of the air filter is to supply the sterilizer with sterile filtered air after the post-vacuum phase. The filter must be replaced after 1500 cycles or annually. (see 6/44)

Pressure gauge

This indicates the pressure in the chamber, even if the power supply is turned off (see 6/43)

Checking: Use an independent calibrated pressure gauge (see 6/47) and compare its readings with those on the sterilizer pressure gauge.

Absolute pressure sensor

Monitors and controls the sterilizer process (see 6/30).

Checking:

Use an independent, calibrated absolute pressure gauge (see 6/47) and compare its readings with those on the display. Range: 0-4 bar absolute corresponds to 0-5 V DC. Output signal at atmospheric pressure about 1.25 V. See also the Service Program section.

Adjustment:

Follow the instructions under “Service program”, but before doing so, check the “Range” and “Offset” values set during pre-delivery inspection.

Temperature sensors

The sterilizer has Pt-100 sensors to monitor:

- a) Steam generator (T4) (see 6/31)
- b) Chamber preheating(T1) (see 6/21)
- c) Sterilizing process (T0) (see 6/41)

Note:

If the sterilizer includes programs for sterilization of liquids, there may be additional Pt-100 sensors.

Checking:

Disconnect the sensor from the control system and check it with an ohmmeter. Its resistance should be about 100 ohm; the higher the temperature the higher the resistance. See also the Service program section.

T4. The temperature sensor for the steam generator is fitted at the front of the steam generator. It controls the steam generator temperature (about 250 °C), and also interrupts a process if the steam generator temperature falls below the pre-programmed value of about 150 °C while a sterilization process is running.

Checking:

This requires the sterilizer to have been turned on for at least an hour. Insert an independently calibrated measuring instrument, capable of measuring to at least 300 °C, in the measurement hole at the front of the steam generator (see 6/61) and wait for the temperature reading to stabilise. It should now show a temperature of between 240 °C and 255 °C. Also compare the temperature during the heating phase, when the steam generator temperature is below 160 °C, comparing the value on the sterilizer display panel with that shown on the instrument.

T1.. The chamber sensor is mounted on top of the chamber, and controls the chamber temperature to the programmed value of about 120 °C.

Checking:

This requires an independently calibrated temperature instrument inserted about 150 mm between the thermal insulation and the chamber on the right-hand side of the sterilizer. Make sure that there is good thermal contact between the thermometer and the wall of the chamber. When the sterilizer is ready for use, this independent instrument should show a temperature of about 120 °C.

Note: If the temperature is to be checked soon after a sterilization program has been run, the chamber must be allowed to cool down, for example by turning the sterilizer off and leaving the door open for about 15 minutes.

Note: The chamber temperature shown on the display during the heating phase may not agree with the value shown by the independent calibrated thermometer. This is because the measurement points are relatively far apart.

T0. The sensor that monitors the sterilization process, and which provides the signal to the display of chamber steam temperature, is fitted in a manifold on the left of the sterilizer.

Checking:

Use an independent calibrated temperature measuring instrument, inserted in the chamber through the connection on the left-hand side of the chamber near the safety valve. Check that its reading with that shown on the display. Alternatively the temperature can be calculated from the pressure reading of a separately connected absolute pressure sensor. (104 kPa ≈ 121 °C, 203 kPa ≈ 134°C.

Ejector

The ejector is fitted in the pipe from pump 2 to the water tank (see 6/23), with its suction line connected to check valve BV3.

The ejector is in the form of a T-piece, containing two ejector nozzles. Note that these nozzles are not identical. The smaller holes in each of the nozzles must face each other, and the nozzle with the largest hole must be fitted in the outlet of the T-piece towards the tank.

Safety valve

Opening pressure 2.7 ± 0.14 bar

Blow-off pressure max 2.97 bar

The function of the safety valve is to relieve the pressure in the chamber if it rises out of control (see 6/22). Check the safety valve with the sterilizer running normally.

- Check that the safety valve is not leaking water or steam.
- Check that the lead seal of the safety valve is intact.

Checking the blow-off pressure of the safety valve:

This is done in the service program; see the relevant section. Select “Component test” and activate “Steam pump”. The safety valve must blow off when the pressure reaches 2.7 ± 0.14 bar. Use an independent pressure gauge for this check.

Adjustments or modifications that change the blowoff pressure of the safety valve may be performed only by an authorised person. The safety valve should be operated regularly, at least four times a year. See heading “Maintenance”. The lead seal must not be broken by anyone other than an authorised person.

Circuit board (see Appendix 3) (see 6/28)

The display unit and the circuit board unit must always be stored in their conductive bags until they are to be fitted to the sterilizer. Before handling any of the electronic spare parts, make sure that you are not electrostatically charged, by touching earthed radiator, for instance.

- Each output is controlled by a triac, so that there is electrical isolation between the electronics and the control voltage to the components.
To check the operation of a triac, activate the relevant output in “component test” and connect a voltmeter between pin 1 (Line N) and the relevant output pin.
the voltmeter shall read $\approx 230V$
- A LED is connected to each output. It is lit when the output is active, ie when it is supplying current to its component (valve, pump, element etc.).
Another LED (H1) is lit when the door is locked
- Programs are stored in a PROM. Markings on the PROM show the program version.
This is how to change the PROM:
 1. Note the calibration settings of the pressure and temperature sensors, the cycle counter and which inputs are activated on sensor open-circuit detection (see Appendix 5), as well as the date of the software. This date is in the service program menu; go to the service program and press the PROGR button. (see 6/45)
 2. Switch off the electric power supply to the sterilizer.
 3. Change the PROM.
 4. Switch on the power.
 5. Note the old cycle counter value on the inside of the circuit-board cover.
 6. Check the calibration settings and sensor activation.
- When changing circuit boards, move the old processor and the PROM to the new board.

Door

Changing the door seal (see Appendix 2)

Unplug the electric power lead when changing the door seal.

- Unscrew the screws and swing out the front.
- Loosen the left-hand side panel fixing screws near the Display and push the side panel back a few centimetres.
- Open the door, move away the stop which limits lateral movement and lift off the door.
- Remove the old seal and clean the seal groove, taking care not to damage it.
- Place the new seal on the door and position it so that it covers the groove. Note: The seal is rectangular.
- Note: The seal is a parallel trapezoid in cross-section. Position the seal so that the right angles of the cross-section are down in the groove.
- Start by pressing down the corners, then the middle, and finally the entire seal.
- Refit in reverse order.

Adjusting the door (See Appendix 2)

**After adjusting the door, check that all nuts and screws are tight.
Take care: some parts may be hot if the sterilizer has recently been used.**

The door adjustment procedure described here may only be needed in exceptional cases, eg if the door is too stiff to lock or if there is leakage that cannot be traced to any other part of the sterilizer.

It is advisable to replace the door seal before the door is adjusted.

Before the door is adjusted, chamber preheating **must** be checked. The procedure for this is described under a separate heading.

- Check that the seal groove and the front of the chamber are undamaged and free from deposits.
- Do the adjustments with the sterilizer heated up.

VERTICAL ADJUSTMENT

The door moves a short distance vertically on interlocking. To allow for this movement, the vertical adjustment of the upper bar (see 2/7) must be correct.

- With the door open and about 15 mm from its right-hand end position, check that there is a depth clearance of about 1 mm at both upper ends of the door.

Adjustment:

- Slacken the nuts (see 2/6) so that the bracket (see 2/5) can change its position.
- Adjust the position of bracket (see 2/5) with screws (see 2/1) . Use the middle screw to pull the bar up and the outer screws to push it down.
- Tighten the nuts (see 2/6).

DEPTH

- Remove the cover plate on which the door switch is mounted, to the right of the door opening.
- Check that the door seal reaches the chamber equally both on top, bottom and left and right side when the handle is turned.

Adjusting for minor errors

- Slacken the affected M10 Allen screws (see 2/3)
- Tighten or slacken the outer M16 nuts (see 2/2) where the error was observed. Do not turn the nuts more than one-sixth of a turn.
- Tighten the M10 screws (see 2/3)

Adjusting for a larger error:

- Slacken the affected inner M16 nut (see 2/4) and the nearest M10 Allen screw (see 2/3). If you need to get to the lower nuts, remove the lower cover plate in front of the steam generator.
- Do not turn the inner M16 nuts (see 2/4) more than half a turn at each adjustment.
- Firmly tighten the M10 screws (see 2/3).
- Tighten the outer M16 nuts (see 2/2).
- Check that the torque required to operate the door handle with a new door seal after a 135° process is between 6,5 and 7,5 Nm (normal hand force.)

Cooler - condenser

Condenses steam to water on pressure reduction (see 6/42)

On condensing the steam, the condenser creates a vacuum in the sterilizer during the pre-vacuum and post-vacuum phases.

Note that the sterilizer is not designed to be built in.

For best performance, the fan (see 6/40) connected to the condenser must be running. In addition, there must be space around the sterilizer in accordance with the installation instructions as set out in the Description of Operation.

Searching for leaks

Alternative 1: Run a leak test programme

If a green "ready" lamp lights up, the sterilizer is leaktight. If a red lamp lights up, there is a leak.

Alternative 2: Bubble test.

Run the sterilizer down to a negative pressure using component test. When the pressure has levelled out, check whether any bubbles appear in the transparent hose joining pump 2 and the tank. If bubbles occur, it is a sign of leakage.

Alternative 3: Leakage test in accordance with EN-285

Perform with a cold sterilizer. The sterilizer should have been switched off overnight.

Disconnect the cables to the element from the circuit board (pins 2, 4, 6 on circuit board, see Appendix 3).

Run the sterilizer down to 70 mbar using component test. Press "Everything off". Wait 5 min., note the pressure, wait a further 10 min. After this time the pressure must not have risen more than 13 mbar.

SERVICE PROGRAM

The sterilizer incorporates a service program comprising:

1. Choice of sterilizer type
2. Choice of language
3. Correction of pressure values
4. Correction of temperature values
5. Reset cycle counter
6. Component test
7. Setting sensor open-circuit detection
8. Erasing EEPROM

Generally there should be no need to calibrate Pt 100 sensors and pressure sensors unless a sensor has been replaced. Language, pressures and temperatures are set at the factory. The cycle counter should only be reset under exceptional circumstances, since doing so means that you lose track of how many cycles the sterilizer has done. The component test can be run during servicing as an easy way of checking the operation of components.

Appendix 5 contains a flowchart of the service program. This is how to access the service program:

- Open the front panel
- Press and hold the switch on the circuit board housing. (see 6/45)
Switch the sterilizer off and on again with the main switch at the back.
Now release the switch on the circuit board housing.
- The service program can now be followed. See Service programme schedule.

1. Sterilizer type

At present there are four types:

- VACUUM: 16-litre sterilizer with vacuum function. (Citomat 164 V, GE 224cV, 203cV):
- THREE-PHASE: 60 litre sterilizer (Citomat 564c, GE 336c)
- TEMP-CONTROLLED: Temperature-controlled (GE 203c)
- NORMAL: 16-litre sterilizer without vacuum function (Citomat 164, GE 224c)

2. Choice of language

Press until the required language appears. (The service program is in English only.)

3. Correcting pressure readings

The measurement range of the pressure sensors is -1 to 3 bar (0 to 4 bar abs).

The pressure can be adjusted and displayed from -1 to 2.5 bar.

The pressure is adjusted by changing the index for “offset” and “range”. The default setting is index 100. Each step corresponds to 0.02 bar.

Calibration: Connect a calibrated absolute pressure sensor. Close the door. Go to the “Component test” menu (see section 6) and activate: cooling fan, MV1 and P2. Wait until the pressure reads about -0.8 bar. Press “everything off”. Note the pressure on the display and compare with the external sensor. If you want a lower value on the display, adjust the offset index to a lower value, and vice versa. For range, go to the “component test menu” and activate P1. Wait until the external pressure gauge reads about 2.1 bar. Press “everything off”. Note the pressure on the display and compare with the external sensor. If you want a lower value on the display, adjust the range index to a higher value, and vice versa.

Hint: Read the actual temperature (T0) and pressure during a component test

Summary: **RANGE:** Higher index gives a **lower** pressure on the display.

OFFSET: Higher index gives a **higher** pressure on the display.

4. Correcting temperature readings

The sterilizer has two Pt 100 sensors for regulation and one Pt 100 sensor for measurement. The measuring range of the steam generator sensor (T4) is 150 °C to 300 °C; the range of the chamber preheating sensor (T1) and the steam temperature sensor (T0) is 50 °C to 150 °C.

To adjust the temperature reading, change the index for offset high or low as appropriate. The default setting is index 100. Each step corresponds to 0.5 °C for the chamber preheating sensor and 0.3 °C for the steam temperature sensor. The index can be set between 75 and 114.

Calibration: (NOTE: Calibrate the pressure sensor first; see above).

T0: (Input 0 Steam) Start a high-pressure program. Wait for the sterile phase, note the temperature reading on the display. If the display reads too high, adjust T0 offset high to a lower value. After adjustment run the high-pressure program and control the temperature. The procedure is the same for T0 offset low, but with a low-pressure ie 121°C program.

Example: At sterilization 2.1 bar, the display reads 140 °C. Reduce the index for T0 offset high by about 18 steps. (18 X 0,3 = 5,4°C)

Summary: **T0 HIGH and LOW:** A higher index gives a higher temperature reading on the display.

T1: (Input 1 Chamber) (NOTE: The sterilizer must have been preheated at least one hour. Place a calibrated temperature sensor between the chamber wall and the insulation. If the external sensor reading is higher than 125 °C ±5 degC, adjust the index for T1 offset high to a higher value. NOTE: If a low-pressure program was chosen, the chamber preheating is regulated to 115 °C ± 5 degC. In this case, adjust T1 offset low in the same way.

T4: (Input 4 Heat acc.) Push a calibrated temperature sensor into the steam generator. There is a hole for this in the plate below the door. Check that the sensor is put into the hole in the steam generator. If the external sensor reads above 250 °C ±5 degC, adjust the index for T4 offset high to a higher value.

Summary: **T1, T4 HIGH and LOW:** A higher index gives a lower temperature at the external sensor and vice versa.

5. Reset cycle counter

Do not do this unless it is absolutely unavoidable.

6. Component tests

Every component that is connected to an output can be tested for correct operation. Actual temperature and pressure are continuously shown on the display during the component test. Note that you must choose “everything off” before individual components can be activated. To deactivate a component, choose “Everything off”. NOTE: When the elements are activated, they are deactivated after 20 seconds. Temperature regulation of chamber and steam generator overrides “Everything off”. Do not activate all three elements at the same time.

General: Check whether the relevant LED lights up on the circuit board on activation.

7. Setting sensor open-circuit detection

When this function is activated, the temperature sensors are monitored for open circuit.

After an open-circuit condition has existed for 20 seconds, the process is aborted and the following error message appears on the display. Fault code 070-074 “PT-100 sensor faulty”, where 070 stands for sensor T0, 071 for T1 and 074 for T4. To remove the error message after taking the appropriate action, switch the power to the sterilizer off and on again.

On setting set 1=active 0=inactive for each input.

The display shows a digit combination made up of five ones or zeros. The first digit stands for sensor T0, the second for T1 and the fifth for T4. So on a 16-litre sterilizer with vacuum function the display should read 11001.

8. Erasing the EEPROM

Do not do this unless it is unavoidable.

NOTE: This deletes all sensor settings and the cycle counter.

Note all settings before erasing the EEPROM (pressures, temperature calibration, sensor open-circuit activation and cycle counter)

After erasing the EEPROM, switch off the power to the sterilizer for a few seconds.

Service programme schedule

Step through using the membrane keys "PROGR", "START", "RESET", "STOP" on the front panel.

<u>ACTION</u>	<u>STEP</u>	<u>STEP WITH</u>	<u>CALIBRATION</u>	<u>ENTER</u>	<u>RETURN</u>			
Sterilizer type	START		PROGR <i>Choose type</i>	START	STOP			
Languages	START 2 times	PROGR	START	PROGR <i>Choose language</i>	START	STOP		
Pressure calibration	START 3 times		PROGR <i>range/offs</i>	START Adjust	START	STOP		
				<i>Prog=Lower Reset=Higher</i>				
Temperature calibration	START 4 times	PROGR	START	PROGR <i>Choose sensor</i>	START	START Adjust high	START	STOP
					<i>Prog=Lower Reset=Higher</i>	<i>Prog=Lower Reset=Higher</i>		
Reset cycle counter	START 5 times		PROGR <i>Yes</i>		START	STOP 2 times		
Component test	START 6 times	PROGR	START 2timesr	PROGR <i>Everything</i>	START	PROGR <i>Choose comp.</i>	START Activate	STOP 2 times
Sensor detection	START 7 times	PROGR	START	PROGR <i>Choose input</i>	RESET <i>1=Aktiv 0=Inaktiv</i>	START Activate	STOP	
Erase EEPROM	START 8 times	PROGR	START	PROGR		START	STOP	

FLOW



TECHNICAL DATA

Width	590 mm
Depth	565 mm
Height	473 mm
Height with feet	493 mm
Weight without vacuum function	84 kg
Weight with vacuum function	90 kg
Chamber width	200 mm
Chamber height	210 mm
Chamber depth	400 mm
Chamber corner radii	20 mm
Chamber volume	16 l
Chamber design pressure	2.7 bar
Chamber regulations	AFS 1994:39
Chamber/door material	Aluminium DIN 1725/1748 equivalent to SIS 4120-02
Max. load textile	2.0 kg
Max. load instrument	4.0 kg
Feed water quality	distilled or de-ionised, max 30 μ S/m
Tank water content, max.	5 litres
Water consumption per process	30 - 100 grams (depends on load)
Electrical supply	as per type plate
Control voltage	as per type plate
Total rating without vacuum function	1800 W
Total rating with vacuum function	2000 W
Rating of steam generator elements	2 x 900 W
Rating of chamber element	900 W
Heat dissipation, closed door, approx	200 W
Heat dissipation, open door, approx	600 W
Sound level	\leq 55 dB
Air filter	EN 143 / P3, 0,4 μ m

TROUBLESHOOTING

Fault	Cause	Action
<ul style="list-style-type: none"> • General. Always begin by checking that the sterilizer has been properly installed, that the tank contains water up to the max mark and that strainers in the tank and chamber are not clogged. 	<ul style="list-style-type: none"> • Sterilizer does not build up pressure after lengthy use. 	<ul style="list-style-type: none"> • Pump 1, its hose and check valve BV1 have dried out.
<ul style="list-style-type: none"> • Pressure is not build up. 	<ul style="list-style-type: none"> • Remove BV1; check that the ball is not stuck. Connect BV1 to the pump. Fill water, start pump, (component test), check that water flows through the pump / check valve. 	<ul style="list-style-type: none"> • Nozzle in steam generator blocked.
<ul style="list-style-type: none"> • Stop in pre-treatment during the Pressure reduction phase 	<ul style="list-style-type: none"> • Clean nozzle and check flow (component test). Flow must be 100-200 ml/min 	<ul style="list-style-type: none"> • Leakage in safety valve. • MV1 or BV3 clogged or faulty. • Pump P2 performance poor. • Pressure sensor miscalibrated or faulty. • Air leakage BV1 leaky.
<ul style="list-style-type: none"> • Stops in pre-treatment during the Pressure increase phase 	<ul style="list-style-type: none"> • Replace safety valve • Check with component test in service program. • Check with component test, replace pump if necessary • Check calibration or replace sensor. • Check for air bubbles in hose to tank. Clean BV1. 	<ul style="list-style-type: none"> • Pump P1 faulty • Nozzle blocked. • P1 not getting water • Pressure sensor faulty • Temperature sensor T0 faulty • Door seal leaky • Hot water. • MV-1 leakage
<ul style="list-style-type: none"> • Completely dark 	<ul style="list-style-type: none"> • Check in component test • Clean nozzle • Squeeze hose before P1. • Check calibration with external sensor. Replace if necessary. • Check calibration, replace sensor if necessary. • Replace door seal • Check fan and cooling. • Change MV-1 	<ul style="list-style-type: none"> • Overheat cutout tripped • Blown fuse at switch or on circuit board.
<ul style="list-style-type: none"> • Stops in post-treatment 	<ul style="list-style-type: none"> • Reset. Check relevant component. • Replace fuse. 	<ul style="list-style-type: none"> • See section pre-treatment, pressure reduction above • BV2 or MV2 faulty
<ul style="list-style-type: none"> • Poor vacuum 	<ul style="list-style-type: none"> • Clean or replace. 	<ul style="list-style-type: none"> • Hot water.
<ul style="list-style-type: none"> • Slow 	<ul style="list-style-type: none"> • Check fan and cooling 	<ul style="list-style-type: none"> • Leakage
<ul style="list-style-type: none"> • Chamber filled with water 	<ul style="list-style-type: none"> • Make a leakage test 	<ul style="list-style-type: none"> • Steam generator not hot enough
<ul style="list-style-type: none"> • Door fails to go up 	<ul style="list-style-type: none"> • Check sensor T4 • Check the elements. 	<ul style="list-style-type: none"> • Air filter obstructed
<ul style="list-style-type: none"> • Pressure stops at vacuum 	<ul style="list-style-type: none"> • Change filter • Check MV-2 	<ul style="list-style-type: none"> • MV-2 or BV-2 fails to open. • Air filter obstructed.

Fault	Cause	Action
<ul style="list-style-type: none"> •Hot water •Long cycles •High water consumption 	Fault in fan or its triac Restricting washer in cooling obstructed Filter obstructed.	<ul style="list-style-type: none"> •Replace fan •Check + clean restricting washer •Check + clean filter.

Leakage test

The sterilizer is equipped with a leakage test programme as standard. A flash program shall be run immediate before a leakage-test program.

Select leakage test on the display. Start the program. If the sterilizer is sealed, the program indicates "klar"("Ready") on the display and the green lamp flashes.

If there is a leak, the red and yellow lamps flash and the "Läckage"("Leakage") text is indicated on the display. Call a service technician if there is a leak.

Getinge Skärhamn's policy:

Constant improvement

It helps us greatly to achieve this if we receive comments on our products from users and service personnel.

A fee will be paid for suggestions that are incorporated in series production.

We would also appreciate being informed of events in which a sterilizer has caused injury.

Write a few lines below and fax or post them to us.

Fax: +46 304 670924.

Address:

Getinge Skärhamn AB

Industrivägen 5

S-47131 Skärhamn

Sweden

Thank you in advance.

Type	Serial no.	Comments

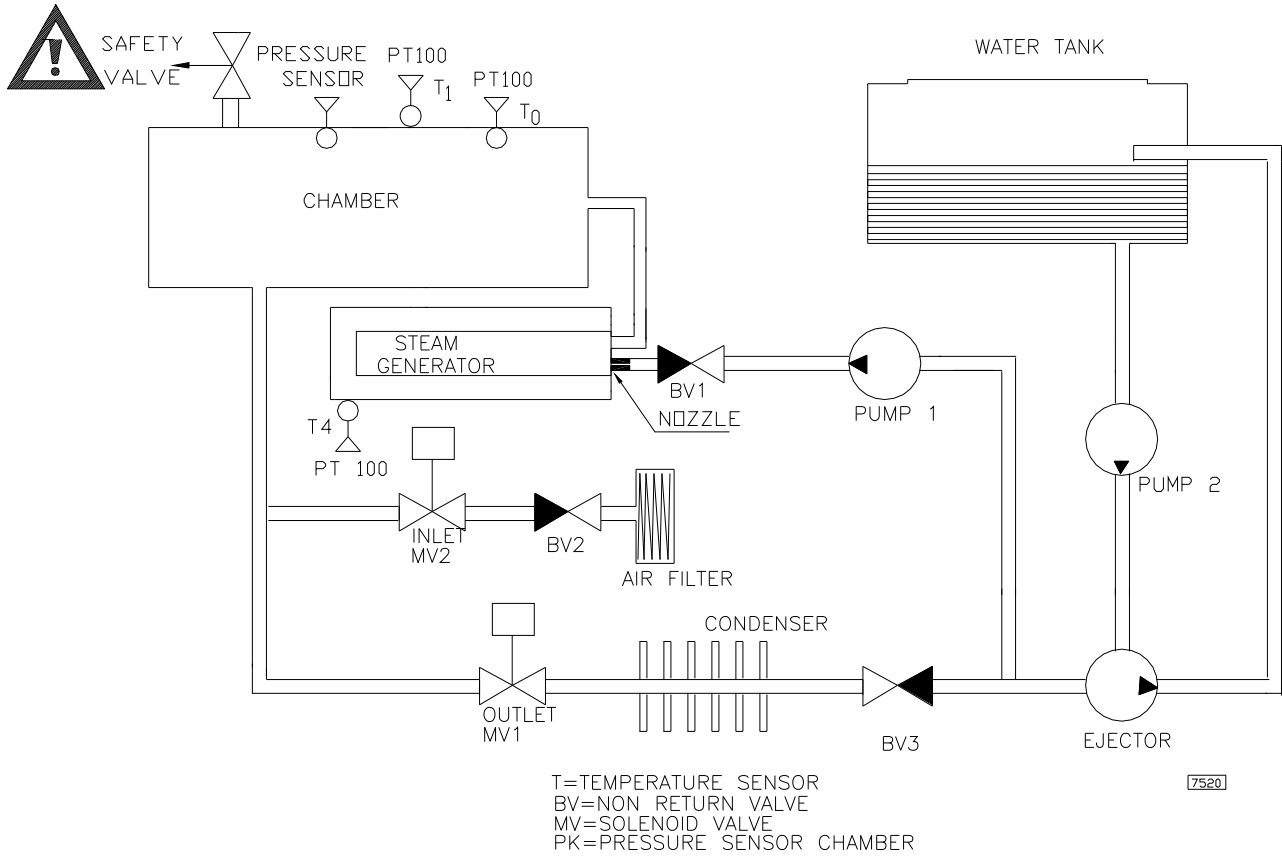
Comments submitted by:

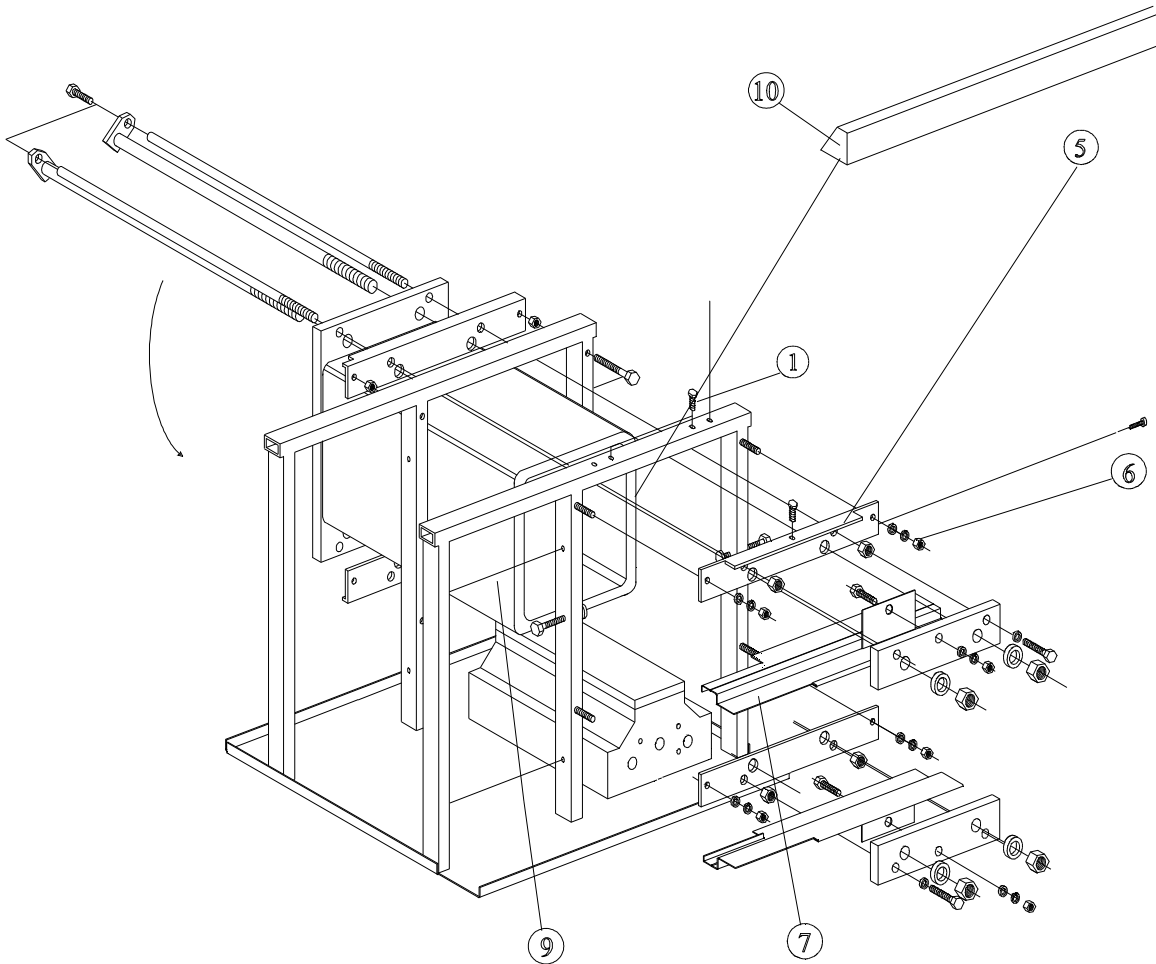
Name:.....Phone.....

Address.....

Flow chart

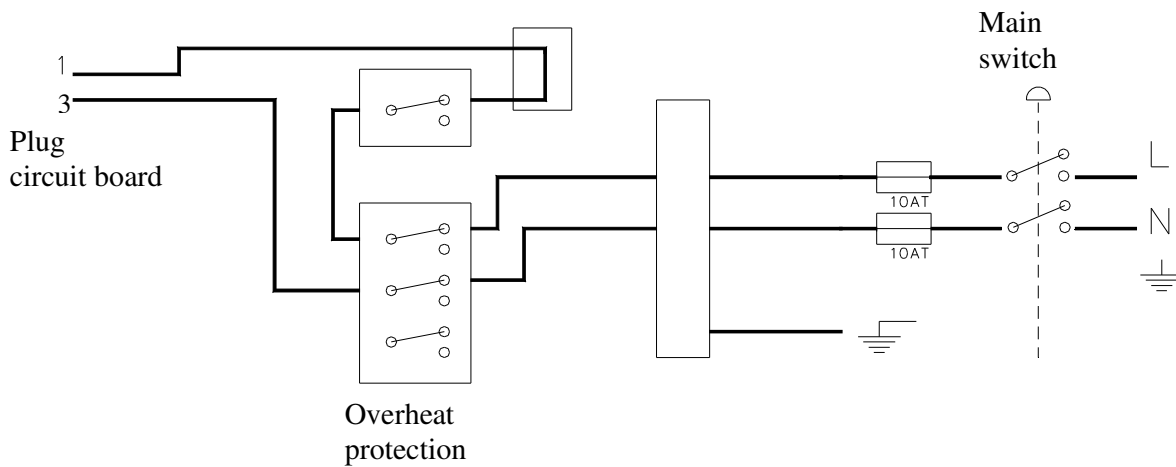
Appendix 1





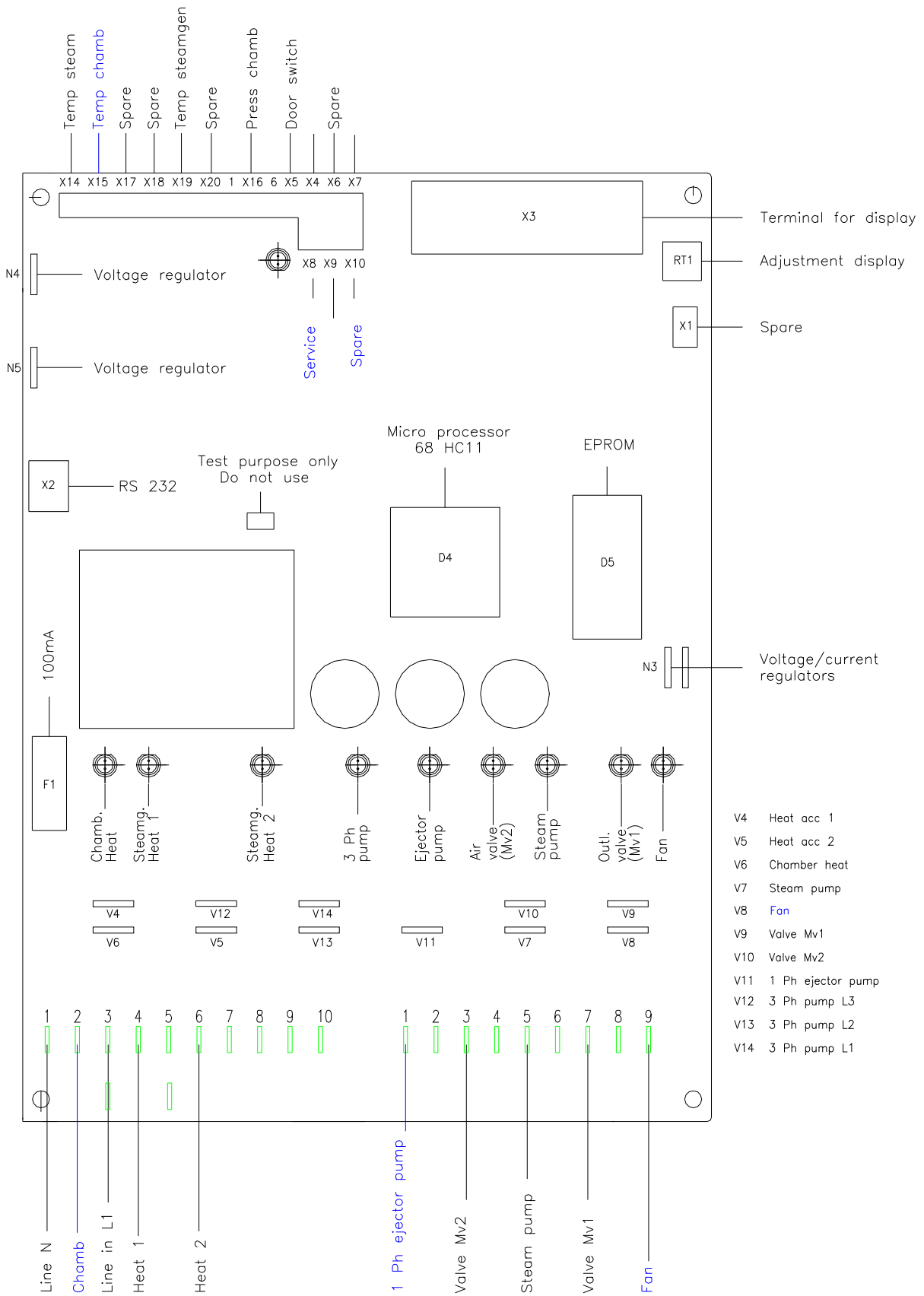
Electrical drawing

Supply voltage

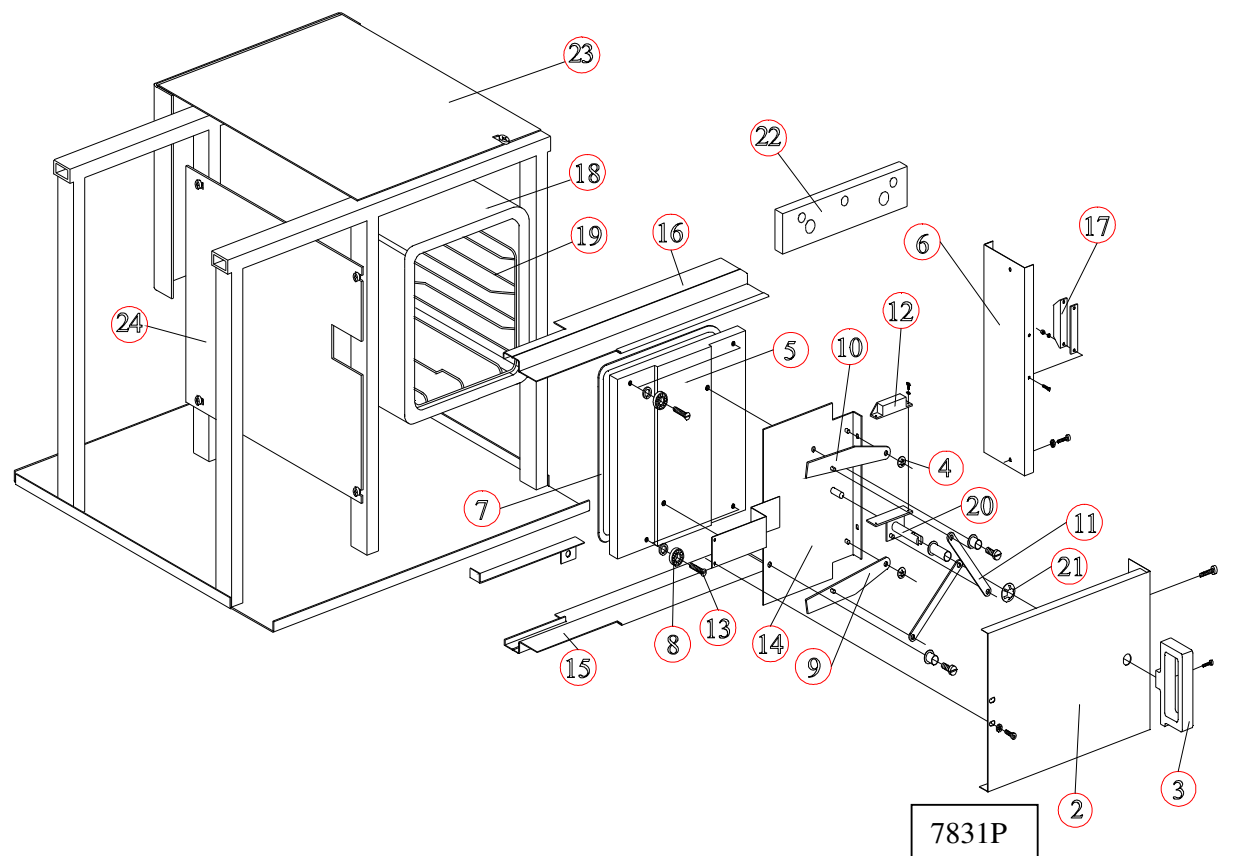


Circuit board

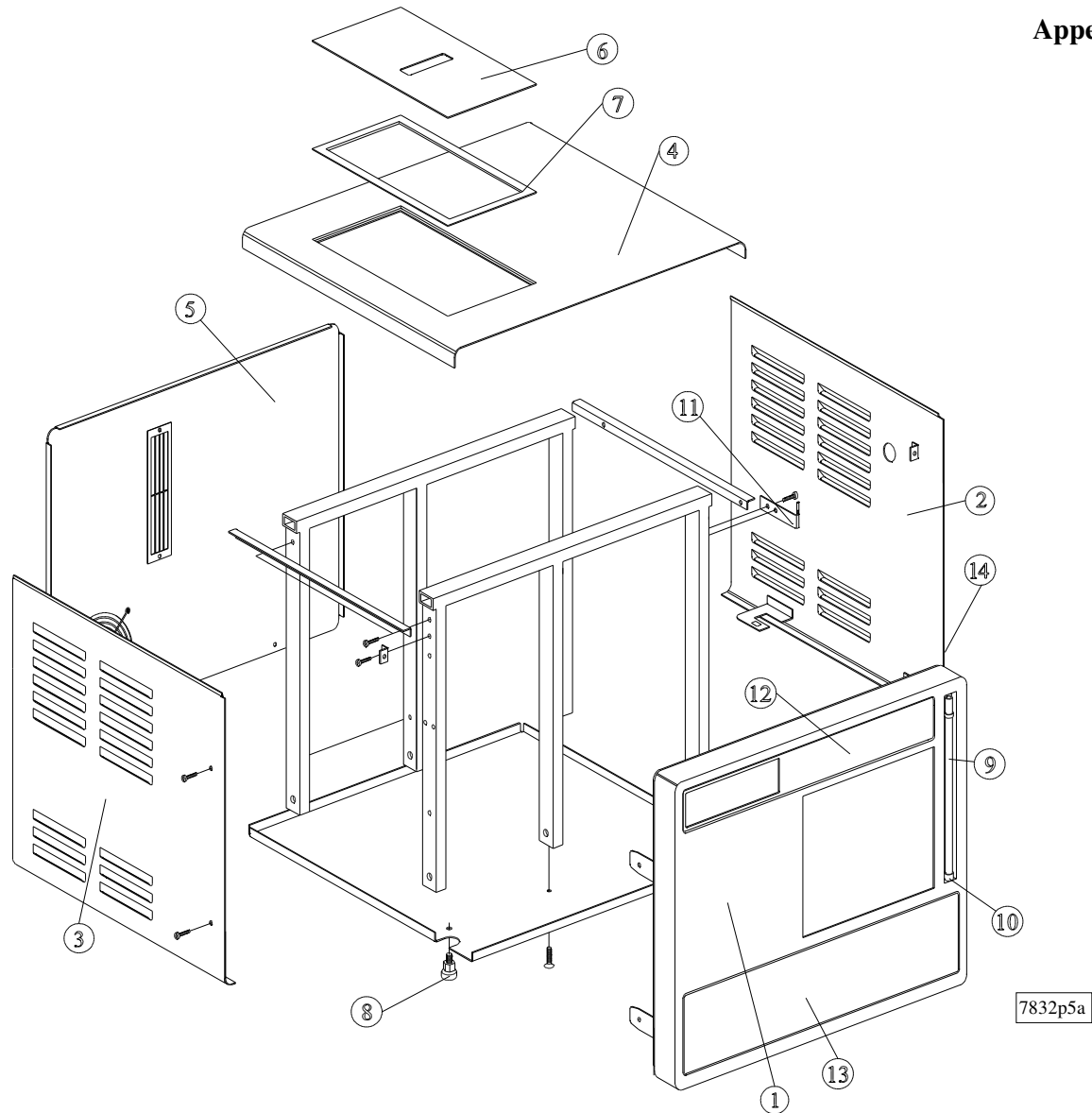
Appendix 3



SPARE PARTS LIST

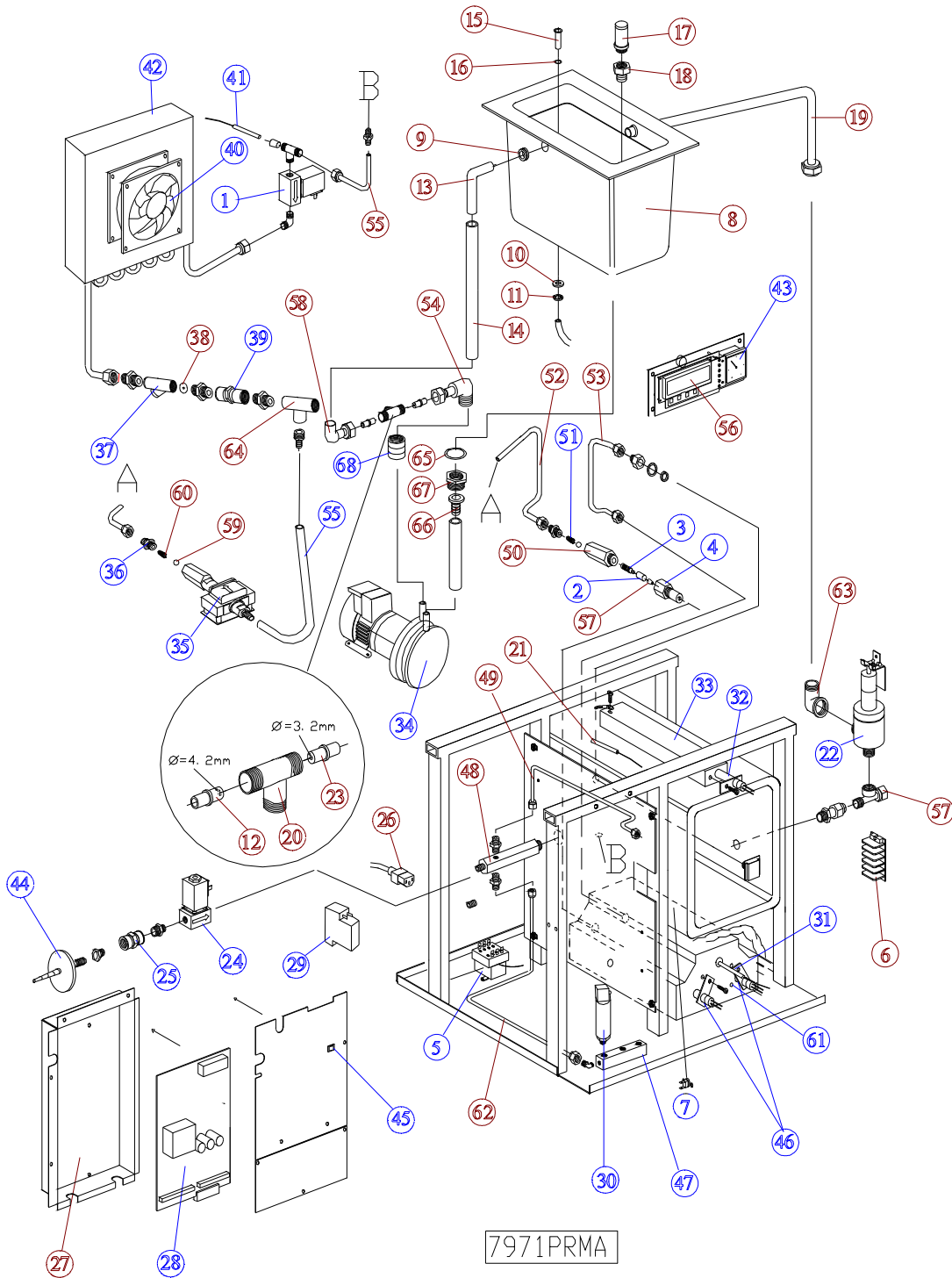


Pos Ref	Antal Qty	Art nr Part No	Benämning	Description
1	1	4832675	Dörr komplett	Door complete
2	1	4832578	Täckplåt	Cover plate
3	1	4832640	Vred svart	Handle black
3	1	4832640/05	Vred vit	Handle white
4	4	4834607/05	Låsbricka	Lock washer
5	1	4832528	Dörrblad	Door
6	1	4832645	Plåt dörr	Sheet door
7	1	4832502	Dörrpackning	Sealing
8	4	4834933	Kullager	Ball bearing
9	1	4832731	Kil nedre	Locking device bottom
10	1	4832703	Kil övre	Locking device top
11	2	4832667	Länk	Link
12	1	4834936	Magnet dörrbrytare	Magnet door contact
13	4	4832514	Skruv	Screw
14	1	4833284	Plåt dörr	Sheet door
15	1	4832572	Skena nedre	Rail bottom
16	1	4832575	Skena övre	Rail top
17	1	4835417	Dörrbrytare	Door switch
18	1	4837511	Kammare	Chamber
19	1	4832650/70	Insats tråd	Rack
20	1	4832527	Vev	Crank
21	1	4834607/12	Låsbricka	Lock washer
22	1	4832534	Linjal	Ruler
23	1	4832537	Takplåt	Sheet
24	1	4832562	Sidoplåt	Sheet chamber



Pos Ref	Antal Qty	Art nr Part No	Benämning	Description	
1	1	4837559/72	Frontkåpa rostfri	Front cover stainless	
1	1	4837559/73	Frontkåpa vitlackad	Front cover white painted	
2	1	4837561/70	Sidokåpa höger rostf.	Right side cover stainless	
2	1	4837561/71	Sidokåpa höger vitl.	Right side white painted	
3	1	4837554/72	Sidokåpa vänst. rostf.	Left side cover stainless	
3	1	4837554/73	Sidokåpa vänst. vitl.	Left side cover white painted	
4	1	4832615/70	Överkåpa rostfri	Top cover stainless	
4	1	4832615/71	Överkåpa vitlackad	Top cover white painted	
5	1	4837546/70	Bakstycke rostfri	Rear cover stainless	
5	1	4837546/71	Bakstycke vitlackad	Rear cover white painted	
6	1	4832624/70	Lock rostfri	Lid stainless	
6	1	4832624/71	Lock vitlackad	Lid white painted	
7	1	4832629	Packning tank	Sealing tank	
8	4	4835331	Fot	Leg	
9	1	4837105	Nivårör komplett	Level tube complete	
10	1	4832519	Profil nivårör	Profile level tube	
11	2	4832678	Gångjärn	Hinges	
12	1	4837481	Dekal	Decal	
13	1	4837551	Dekal	Decal	GE 224cVac
13	1	4837626	Dekal	Decal	Citomat 164
14	1	4834997	Nummerskylt	Number plat	

Components



Pos Ref	Antal Qty	Art nr Part No	Benämning	Description
1	1	4834100	Magnetventil	Solenoid valve
2	1	4835010	Filter	Filter
3	1	4835387	Virvelbildare	Turbulence producer
4	1	4837949	Hus munstycke	Nozzle housing
5	1	4835419	Överhettningsskydd	Overheating protection
6	1	4835388	Kopplingsplint	Terminal board

Pos Ref	Antal Qty	Art nr Part No	Benämning	Description
7	1	4834939	Överhettningsskydd	Overheating protection
8	1	4837694	Tank	Tank
9	1	4834066	Genomföring	Joint
10	1	4834353/08	Bricka	Washer
11	1	4834607/10	Låsbricka	Lock washer
12	2	4837627	Dysa ejektor	Receiving nozzle, ejector
13	1	4837365	Rörkrök	Elbow pipe
14	1	4837368	Slang	Hose
15	1	4835223	Rörnät	Distance
16	1	4835066	O-ring	O-ring
17	1	4835427	Sil	Strainer
18	1	4835423	Nippel	Nipple
19	1	4837526	Rör	Tube
20	1	4835479	T-koppling	T junction
21	1	4835390	Temp. givare Pt-100	Temp. transmitter Pt-100
22	1	4834152	Säkerhetsventil	Safety valve
23	1	4837628	Munstycke ejektor	Jet needle, ejector
24	2	4834100	Magnetventil	Solenoid valve
25	1	4834687	Backventil	Non return valve
26	1	483553201	Nätssladd	Cable
27	1	4837495	Plåtlåda kretskort	Box control unit
28	1	4837422	Kretskort	Control unit
29	1	4835565	Strömbrytare /säkr.hållare	Breaker/fuseholder
30	1	483548501	tryckgivare	Pressure transmitter
31	1	483539001	Temp. givare Pt-100	Temp. transmitter Pt-100
32	1	4833215	Element 900W	Element 900W
33	1	4831621	Elementkonsol	Element bracket
34	1	4835580	Pump	Pump
35	1	4835224	Pump	Pump
36	1	4835226	Nippel	Nipple
37	1	4835628	Filter hus	Filter house
38	1	4839171	Strypbricka	Restrictor
39	1	4834687	Backventil	Non return valve
40	1	4835614	Fläkt	Fan
41	1	483539003	Temp. givare Pt-100	Temp. transmitter Pt-100
42	1	4839226	Kyl	Cooler
43	1	4837031	Manometer	Manometer
44	1	4835626	Filter	Filter
45	1	4835253	Brytare	Breaker
46	1	4833215	Element 900W	Element 900W
47	1	4839255	Konsol tryckgivare	Bracket pressure transmitter
48	1	4839232	Fördelarstycke	Distribution pipe
49	1	4839251	Rör	Tube
50	1	4839261	Nippel	Nipple
51	1	4835059/03	Fjäder	Spring
52	1	4837521	Rör	Tube
53	1	4839114	Rör	Tube
54	1	483	V-koppling	Angular junction
55	1	4837705	Rör	Tube
56	1	4837480	Display	Display
57	1	4835393	Insats	Restrictor
58	1	4835495	V-koppling	Angular junction
59	1	4835059/05	Kula	Ball
60	1	4835059/04	Fjäder	Spring
61	1	4837727	Värmekropp	Steam generator
62	1	4839248	Rör	Tube
63	1	4839303	V-koppling	Angular junction
64	1	4834207	T-koppling	T-junction
65	1	4835428	Packning	Washer
66	1	4835428	Slangnippel	Niple Hose
67	1	4835423	Nippel	Nipple
68	1	4835599	Plast koppling	Plastic junction

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