Maintenance instructions

Cliniklav® 25

Large steam sterilizer

Servicing of this device is to be conducted exclusively by an expert service technician trained by MELAG and in accordance with the applicable directives.

MELAG Medizintechnik
Geneststraße 6 -10
10829 Berlin
Germany

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About this manual

Symbols used

Symbol	Explanation
	Indicates a dangerous situation, which if not avoided, could entail slight to life-threatening injuries.
	Draws your attention to a situation, which if not avoided, could result in damage to the instruments, the practice fittings or the device.
	Draws your attention to important information.

PLEASE NOTE
Repair work is not part of the maintenance.

Maintenance intervals

Maintenance is to be performed after every 1000 cycles or after 12 months at the latest.

General safety information

When carrying out maintenance work at the device, comply with the following safety instructions as well as those contained in subsequent chapters. Failure to comply with the safety instructions can result in injury or damage to the device.

- Its service and repair may be performed only by authorized technicians.
- Switch off the steam sterilizer at the power switch and remove the cable before opening the device.
- Comply with the relevant safety regulations during operation of an electrical appliance without housing parts. These actions must be performed by a qualified electrician (in accordance with VDE 0105-100 or IEC 60050).
- Some components of the control electronics and other components remain live even after the power switch has been switched off. Switch off the device at the power switch and remove the cable before touching the live parts.
- Determine absence of voltage on all poles.
- Danger of burns – Ensure cooling before touching components.
- Should it be necessary to remove the casing in order to perform maintenance work on the device, take care with sharp edges. Comply with the working safety regulations and wear suitable protective gloves.

PLEASE NOTE
Comply with the sequence prescribed in the maintenance instructions to ensure safe working.

Note on complaints

If reasons for complaints are found during maintenance, these must be reported directly and immediately to MELAG.

Reasons for complaints can be:

- repeated occurrence of the same malfunction message despite remedial measures
- unidentifiable performance impairments

Complaints must be reported to MELAG Customer Service by e-mail (hotline@melag.de) or by telephone (+49 (0)30 75 79 110).

Tools/resources

Contents of the maintenance set (art. no. ME70007)

Article	Art. no.	Article	Art. no.
Sterile filter with conical base	ME20160	2x Washer (30 x 42 x 0.1)	--
Grease Molykote MULTILUB	ME88915	Cu seal for flow nozzle / cavitation protection nozzle	ME43350
3x Seal for safety combination	ME26540	Sealing red for steam generator	ME54700
MELAG-Oil for door lock nut	ME27515	Seal for EN 1717 - safety combination	ME54920
Fine filter measuring unit / cavitation protection nozzle	ME31160	2x Rubber seal ¾“ for external water supply	ME 56950
Retaining ring	--	Insulating sleeve Cinch plug	--
2x Washer (30 x 42 x 0.2)	--	Spatula for applying lubricants	---

Optionally required articles

Article	Art. no.	Article	Art. no.
Spring safety valve	ME24105	Mains filter	ME21691
Door locking nut (with cogwheel, washers and bearing)	ME70201	Relay for steam generator	ME21550
Door locking spindle complete with spring	ME70202	EPROM for software update	ME12593
Pressure switch door lock	ME45732	Conversion kit for cable harness	ME22855
Float sensor	ME40816	Pressure switch for cooling water	ME35781
Conversion set for water level in storage tank	ME55625	Door seal	ME28680
PTFE hose 8/6x1 mm (5 m)	ME39180	Sieve for feed water / cooling water / de-ionised water	ME35570

Spare parts of accessories

Accessories	Article	Art. no.
Water treatment unit MELAdem 55		
	Fine filter	ME37450
	Activated carbon filter	ME37460
	Mixed-bed resin cartidge	ME37470
Log printer MELAprint		
	Ink ribbon	ME41940
	Paper for printer (5 rolls)	ME35225

Tools

- Feeler gauge 2.8 mm strength (art. no. ME37380), alternatively, an Allen key 2.5 mm and 3 mm, minimum length 15 cm
- Cleaning fluid (alcohol, spirit, metal cleaning fluid, e.g. sidol or other)
- Measuring container / bucket (minimum capacity: 5 l)
- Measuring devices: conductance meter (e.g. MELAtest), Ammeter (recommend clip-on ammeter)
- Compressor for leak detection
- Soapsuds, brush or leakage spray
- Hand held vacuum cleaner

- Means of documentation (e.g. MELAprint, MELAview, CF card, CF card printer)

Additionally applicable documents

The following maintenance record is a part of these maintenance instructions:

- Maintenance record (doc. WP_C25_EN_v2 - revision: 2)
- Current software versions (doc. AS_023-20)
- Instructions for assembly the pressure switch door lock (doc. AS_01-05)
- Instructions for adjustment and service of the electric motor-driven door (doc. JA_01-00)
- Instructions for conversion the door cable insulation (doc. AS_01-02)
- Handling and repairing blade receptacles (doc. AS_017-18)
- Resetting the maintenance counter (doc. PW_D)
- Guidelines for handling and repairing blade receptacles (doc. AS_017-18)
- Manufacturer's recommendation for electrical test during initial commissioning and following maintenance and repair (doc. ME_001-16)
- Guidelines for recurrent testing on pressure devices (doc. ME_003-16)
- Renewed performance qualification after replacing device components (doc. ME_004-20)

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1 Preparations

1.1. Perform a vacuum test

- If possible, the operator should run out the program “Vacuum test” in a cold state in order to document the starting state without any loss of time. Alternatively, the “Vacuum test” can also be started by the technician when starting the maintenance and the maintenance of the MELAdem 55 can be started after evacuation

1.2. Check the state of the software

PLEASE NOTE

It may be necessary to revalidate the device after performing a software update.

- Check whether the current device software requires an update with a MELAG-recommended software update.

PLEASE NOTE

In order to perform the following maintenance steps, it is necessary to remove the housing of the steam sterilizer. The steam sterilizer remains fully functional.

2. Working in accordance with the “Recommendation for recurrent testing on pressure devices”

- Perform all work in accordance with the “Recommendation for recurrent testing on pressure devices”.
- Check the last replacement date of the spring safety valve and replace the valve if necessary. The replacement interval is every 2 years.

PLEASE NOTE

MELAG recommends that you note the date of the last replacement on the valve or in the device in order to ensure that the following replacement is performed in time.

3. Maintenance of the water treatment unit MELAdem 55 (optional)

If the steam sterilizer is supplied with water via the water treatment unit (e.g. MELAdem 55), this also requires maintenance. Detailed information for maintenance can be found in the operating manual of the water treatment unit.

- Check and clean the filter housing, the seals and the storage container for.
- Replace the fine filter and the activated carbon filter.
- Replace the mixed-bed resin cartridge if the conductivity is bad (bad permeate quality).
- Measure the conductivity after treatment (without ion exchanger) (max. 10 % cold water / < 120 µS/cm).
- Measure the permeate production after the ion exchanger. The permeate production should amount 60-140 ml/min.
- When the mixed-bed resin is exhausted (conductivity > 15 µS/cm), replace the mixed-bed resin cartridge.
- Measure the conductivity after the ion exchanger after replacing the mixed-bed resin cartridge (after 5 min rinsing time). The conductivity should amount max. 5 µS/cm.
- Generate dynamic pressure by staking the float switch in the storage container and check whether the shut-off valve stops the effluent flow after approx. 10 min. Check for leaks.
- Check whether a PTFE intake hose (Teflon, Ø 8/6 mm) is present in the storage container. If a silicon hose (rubber) is fitted, replace this by a PTFE hose.

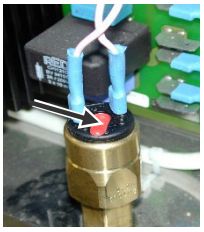
4. Maintenance of the steam sterilizer - static checks / functionality

4.1. Chamber and mount

- Check the chamber and mount for soiling or flash rust.
- Should soiling or flash rust be found, inform the operating personnel of the need for weekly in-house maintenance. Remove any soiling in the chamber and accessories with spirit or cleaning alcohol. Use a chlorine- and vinegar-free cleaning fluid. Use a polishing cloth or sponge if necessary.

PLEASE NOTE
Soiling in the chamber and its accessories should be cleaned within the scope of the weekly inspection by the customer/operator and is not necessarily a part of maintenance.

4.2. Pressure switch door lock



The door lock pressure switch must be marked with a point of red sealing wax. If this mark is missing, replace the previous pressure switch by the new one with sealing wax point.

4.3. Cooling water inflow and outlet hose

Check and if necessary replace the cooling water inflow and outlet hose for damages and leaks. Check the hose clamps and connections of all inflow hoses for leaks and stability. The outlet hose must be fitted at a constant decline to the siphon without kinks or sagging.

4.4. Cooling water and feed water intake filter

- Check, clean and if necessary replace the sieve inserts in the cooling water and feed water inlet fitting (on the underside of the device). For pressure release start a vacuum test with closed water inflow.
- At optional water leakage detector: remove, clean and if necessary replace the filter sieve.
- Check and clean the filter sieves in the straight connection pieces of the grey water supply hoses, if present. Replace hose seals if worn.
- Replace the sealing ring in the angled pipe of the safety combination EN 1717, if present.

4.5. Door seal

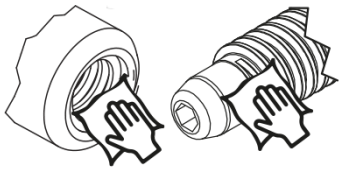
- Clean the door seal with spirit (or a pH-neutral cleaner) and check for wear and tear and cracks. Replace worn, porous or cracked door seals.
- Check the chamber flange for soiling. Clean if necessary. Do not use a cleaning agent which could damage the surface of the round blank.

4.6. Door and door lock

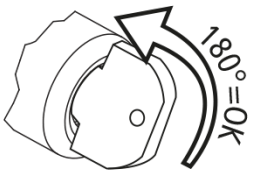
Check the door including all locking components as well as the electromotive door lock according to the separate set of instructions for correct adjustment, wear or defects. Check the compliance of the required tolerances.

PLEASE NOTE: The test gauge is adapted to a lock nut with a TR20x3 thread. Do not use the test gauge on lock nuts with a TR20x4 thread.

- Replace the door lock nut including chain pinion every 4 years at the latest.
- Check the lock nut for wear:
  1. Open and close the door a number of times. Listen for unusual noises such as snapping or grinding; an equal closing sound is necessary.
  2. Upon hearing unusual noises, remove both ball bearings. Free both ball bearings and the lock nut bracket from old grease. Apply new grease (grease Molykote MULTILUB, included in the maintenance set).
  3. Clean the internal thread of the lock nut.

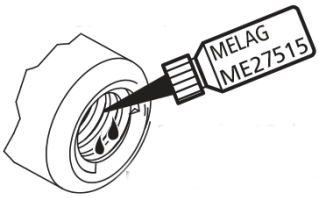


4. Insert the test gauge into the lock nut to the stop and turn it 180°. If this is not possible or resistance can be felt, the lock nut is worn.
5. Clean the locking spindle completely and check for damages.
6. Given damage or wear, replace the locking spindle (art. no. ME70202) and/or the lock nut (art. no. ME70201).



NOTICE
Only use the MELAG oil (art. no. ME27515, included in the maintenance set) to oil the lock nut.

7. Put two drops of MELAG oil in the front threads of the lock nut.



PLEASE NOTE

If there is not yet a label on the inside of the door to advise the user to oil and check the lock nut, then carry out the following work:

- Place the label (included in the maintenance set) clearly visible above or below the lock nut.
- Put four drops of MELAG oil in the front threads of the lock nut.
- Train the user on bi-monthly maintenance.
- Hand over the test gauge and the oil to the user.

NOTICE
Incorrectly fitted bearing shells can result in damage to the door-lock nut. When re-installing the axial bearing, fit the bearing shell with the smaller interior diameter in the direction of the sprocket.

- Replace the retaining ring of the door nut.
- Check the safety screws of the door hinge.
- Check the door hinge pivot: the door can be raised / tilted by a max. of 2 mm.
- Clean and grease the door hinge with a spatula for applying lubricants (grease Molykote MULTILUB, included in the maintenance set).
- Check a door clearance of approx. 2.8 mm.
- Check and adjust if necessary the thread spindle alignment.
- Check the bearing bolt of the engine bracket and the pressure spring.
- The engine bracket needs to slide easily. Check and adjust if necessary the slide pin of the engine bracket.
- Check the bump stop rubbers and tension spring of the engine bracket.
- Check the chain pinion of the door engine.
- Oil the guide bar and bearing supports of the door cover (art. no. ME27515, included in the maintenance set).
- Check and adjust if necessary the switching point of the limit switch door engine for a clearance of 1.5 mm.
- Check and adjust if necessary the position of the (plastic) door cover for 8 mm clearance to the display.
- Check and replace if necessary the door cable harness. The conversion kit for the cable harness can be ordered separately, see separate set of instructions “Conversion door cable insulation”.
- Check, tension if necessary and grease the drive chain (grease Molykote MULTILUB, included in the maintenance set). Check the chain tensioner.

4.7. Door contact switch

Close the door slowly using the crank handle. Approx. ¾ of a revolution before end position, the door contact switch should close (check via “Diagnosis-Program – Digital inputs – input 1”). Setting is performed by changing the switch position, by turning and re-countering the two nuts.

4.8. Sterile filter

Replace the sterile filter during every maintenance.

4.9. Fine filter and cavitation protection nozzle

- Replace the fine filter in the solenoid valve (SV) hose coupling cavitation protection.
- Check and clean the cavitation protection nozzle and replace the seal.

4.10. Steam generator

Open the steam generator. Therefor remove the rear cap on the steam generator (secured with 4 nuts).

- Check the interior wall of the steam genereator. There must be no significant limescale deposits. Otherwise check the conductivity measurement of the device.
- Replace the o-ring and remount the cap.
- Check the front cap for stability, tighten the nuts slightly if necessary.

4.11. Mains filter

The line filter should be replaced once. Replace the filter with a plastic housing with a new filter with a metal housing.

WARNING

Danger of an electric shock from the live components

- Ensure that the steam sterilizer is switched off and the power plug has been disconnected.
- Comply with all valid safety regulations when working with live components and devices.

4.12. Steam generator relays

Replace the previous steam generator relays without the green point (fig. 1) with the new relays (fig. 3). If a relay with a green point (fig. 2) has been fitted, it is not necessary to replace it. Please observe that the latest steam generator relays (fig. 3.) should be fitted in a position 180° rotated (see figures) due to an altered pin assignment. Replacing the input / output clamps when turning presents no problem.

Fig. 1 Old relays without point

Fig. 2 Old relays with point

Fig. 3 New relays

4.13. Check all hoses

- Check all hoses in the interior of the steam sterilizer for damage or abrasion following vibration as well as for correct position.
- Check for limescale and water residue in the steam sterilizer and point out any leaking hose connections.
- Check all couplings for stability and tighten by hand. Then tighten with an open-end wrench by max. ½ revolution.

4.14. Check the electrical cable connections

- Check all cable connections for stability, any damage and their correct installation. If necessary, correct and tighten. The cables may not be permitted to come into contact with any of the parts which could become hot during operation (e.g. the chamber).
- Check the mains supply (3 phase), mains filter (3 phase), network relays (3 phase), mains fuses / fuse holder (3 phase) and the connections to the control electronics.
- Increase the fuses contact pressure through gently pulling apart the pressure spring in the screw head of the fuse holders.

- Check the rectifier plug screw fittings on the solenoid valves for stability.

4.15. Cleaning the interior of the device

✓ *Power plug is disconnected*

- Free the steam sterilizer interior of dust, e.g. with a hand vacuum cleaner. The housing fan and the vacuum pump must remain clean in order to ensure the long-term performance of the steam sterilizer.

4.16. Cooling water quantity

The quantity of cooling water is of decisive importance, both for the performance of the vacuum pump and its life-expectancy (limescale with insufficient volume of cooling water).

- Determine the quantity of cooling water as follows:
  1. Disconnect the steam sterilizers outlet hose from the outflow and let it flow into a suitable receptacle (e.g. a bucket with gradation).
  2. Connect the power plug and switch on the device.
  3. Switch on in the diagnosis program **`ACOUT: AC outputs`** → **`A3: Vacuum pump`** and measure the time. 1-1.4 l should flow into the receptacle.
  4. Repeat procedure with **`ACOUT: AC outputs`** → **`A9: SV water ring 2`**. If the blue 1.2 l flow restrictor nozzle is fitted as factory default, 1-1.4 l/min should flow into the receptacle. If the green 2 l flow restrictor nozzle is fitted, 1.8-2.2 l/min should flow into the receptacles.
- If the result differs, check the cooling water block and the flow restrictor nozzle.

5. Parameter alterations (only up to SN 1125-C1020)

5.1. Conductivity threshold values

- In the `Service-Menu` → `Conductivity` reduce the conductivity for `L1` to 20 µS/cm and `L2` to 35 µS/cm (until device software version 3.34). From software version 4.07 alternatively a parameter update to software version 4.12 and higher can be performed.
- Instruct the users according to altered threshold values and refer to the user manual in the download center of the MELAG website.

6. Function check

6.1. Perform a vacuum test

- Perform the **`Vacuum test`** program. Compare the results with the vacuum test performed before maintenance. Place the program log with the maintenance record.
- Read off the leakage rate and evacuation time from the program log and enter it in the maintenance record. The maximum evacuation time amounts 2 min. if the evacuation time has been exceeded or the leakage rate is higher than 1.0 mbar/min, check the steam sterilizer for leaks, the function of the solenoid valve and any wear of the vacuum pump.

6.2. Leakage search (only where leakage rate is too high / problems with the Bowie & Dick test)

- If the vacuum test produces a leakage rate of more than 1.0 mbar/min or a Bowie & Dick test produces an inadequate result, check the device for leaks in the following manner. Different software versions necessitate different steps.
  1. **Variation 1)** When switching on the device, the LED of the rectifier plug SV “emergency release” illuminates immediately: remove the rectifier plug from the SV “emergency release”.
     Variation 2) When switching on the device, the LED of the rectifier plug SV “emergency release” does not illuminate. No measures are necessary.
  2. Connect the compressor to the emergency release hose.
  3. Working in the **`Diagnosis Program`** → **`ACOUT: AC-Ausgänge A8`** activate **`MV Belüftung`**.
  4. Switch on the compressor until the display registers a pressure of approx. 1 bar. The lower display row changes between the switch state of the valve and pressure / temperature display.
  5. Close the connection tot he compressor or alternatively:
     Variation 1) Re-mount the rectifier plug to the solenoid valve “emergency release”.
     Variation 2) Switch **`ACOUT 2`** in the **`Diagnosis Program`** (up to software version 3.34 **`Reserve`** was displayed here).
- The chamber pressure can be observed on the display.

- To locate all leakages, cover all the critical locations (hose and pipe connections, seals etc.) with soapsuds (using a paintbrush) or leakage location spray. Bubbles are formed at the leakage points. Bubble formation at the waste water connection indicates leaky valves.

6.3. Flow monitor / query of the float switch

- Disconnect the feed water hose between the device and the storage tank. Start the **`Universal Program`**. At the second feed fault 14 “No feed water” should develop, otherwise check, reset and if necessary replace the flow monitor. Connect the feed water hose again.
- With flow monitors without a green point on the housing: re-set the pressure values P24 and P42 in the **`Service Program`** to 500 mbar or replace the flow monitor.
- For optimization purposes it is possible to fit the conversion set in order to measure the float switch in the storage container MELAdem 55 (as of software version 4.06).

6.4. Pressure switch cooling water / leakage water detector (optional)

- Close the cooling water inflow to check the cooling water pressure switch.
- Start the V**`acuum test`**. Fault 13 “No cooling water” should develop after approx. 30 s, otherwise replace the cooling water pressure switch.
- Moisten the sensor to check the optional leakage water detector (water stop). A warning signal should sound immediately and the solenoid valve of the leakage water detector should close. Unplug the sensor. After drying the sensor and waiting 30 s re-plug the leakage water detector (the leakage water detector must engage audibly).
- Open the cooling water inflow again. A clear water flow noise is noticeable for a short time.

6.5. Program run “Bowie & Dick test” with test body system according to EN 867-5

- Perform a test run with a test body system after EN 867-5 (e.g. MELAcontrol Pro) without load. Record a text and graphic log. A multiple program start could be necessary in order to re-fill the emptied feed-water suction hose following the previous tests.
- Control all the connections for leakage during the test run (in over-pressure).
- Control the motor ball valves for smooth running and correct end position.
- Press the '-' key and measure the current conductivity. Compare this value with the conductivity in the storage container measured with an external device. Tolerances of up to 10 µS/cm are permissible.
- Perform an acoustic control for unusual noises during the test run (e.g. the banging of loose components upon vibration/unusual noises emerging from the vacuum pump, especially during evacuation).
- Measure the heating current on the steam generator with (clamp) ammeter during heating. The nominal current must be located symmetrically at approx. 12-13 A per phase at 230 V mains voltage against the neutral conductor.
- Attach a log printout in the maintenance record. The Bowie & Dick indicator strip remains with the customer.

7. Electrical test in accordance with EN 50678 (VDE 0701) or national standard

1. Switch off the steam sterilizer and disconnect the power plug.
2. Refit the housing parts.
3. After closing the device, perform the electrical test in accordance with EN 50678 (VDE 0701). Observe and comply with all statutory national specifications.
4. The measuring device to be used for these tests must be subject to regular checks and calibration in accordance with VDE 0413 or EN 61557.

PLEASE NOTE
Further information you can find in the MELAG document “Manufacturer's recommendation for electrical test during initial commissioning and following maintenance and repair”.

8. Resetting the maintenance counter

- Reset the maintenance counter in accordance with separate instructions after concluding the work.