

SPECIFICAȚIA TEHNICĂ COMPLETATĂ

Pentru Lotul 141 Servicii de menenanță pentru Autoclav și sterilizator Melag

- 141.1 Menenanță pentru Autoclav și sterilizator Euroclav 23S, Melag, Germania
- 141.2 Menenanță pentru Autoclav și sterilizator Euroclav 23 VS+, Melag, Germania
- 141.3 Menenanță pentru Autoclav și sterilizator Euroklav 23VS, Melag, Germania
- 141.4 Menenanță pentru Autoclav și sterilizator Cliniclav 25, Melag, Germania

Specificația tehnică deplină solicitată de către autoritatea contractantă	Specificația tehnică propusă de operatorul economic
<p>Lucrări necesare de întreținere a dispozitivului conform manualului de service și recomandării producătorului dispozitivului medical.</p> <p>1. Obligatoriu se va prezenta lista lucrărilor de menenanță și numărul de intervenții planificate de menenanță de la producător, care urmează să fie desfășurată.</p>	<p>DA Lucrări necesare de întreținere a dispozitivului conform manualului de service și recomandării producătorului dispozitivului medical.</p> <p>1. DA Obligatoriu se va prezenta lista lucrărilor de menenanță și numărul de intervenții planificate de menenanță de la producător, care urmează să fie desfășurată. –</p> <p>Vezi User Manual Euroklav 23-S Vezi Maintenance instructions Euroklav 23-S,23S+ Vezi User Manual Euroklav 23 VS+ Vezi User Manual Euroklav 23 V-S Vezi Maintenance instructions 23 VS+, 23 V-S Vezi User Manual Cliniclav 25 Vezi Maintenance instructions Cliniclav 25</p> <p>2. Prezentarea listei detaliate cu costul fiecărei activități întreprinse. -În Formularul Anexa 23 este indicată prețul pentru vizita care include și serviciu de urgență.</p> <p>3. Prezentarea listei cu prețul piese de schimb, kit de menenanță care urmează să fie înlocuite în procesul de menenanță.,</p>
<p>Numărul de intervenții tehnice asupra dispozitivului medical conform recomandării producătorului dar nu mai puțin decât numărul de intervenții solicitate.</p>	<p>DA Numărul de intervenții tehnice asupra dispozitivului medical conform recomandării producătorului dar nu mai puțin decât numărul de intervenții solicitate.</p>
<p>Agentul economic v-a asigura lucrări de întreținere a dispozitivului medical solicitat și lucrări pentru toate dispozitivele aferente care sunt în legătură directă cu dispozitivul medical, sau accesori. Înlăturarea tuturor defecțiunilor depistate, tehnice cât și cele de program.</p>	<p>DA Agentul economic v-a asigura lucrări de întreținere a dispozitivului medical solicitat și lucrări pentru toate dispozitivele aferente care sunt în legătură directă cu dispozitivul medical, sau accesori. Înlăturarea tuturor defecțiunilor depistate, tehnice cât și cele de program.</p>
<p>Intervenții de urgență</p> <p>Lucrări de diagnosticare, testare, reparație în cazul defecțiunilor minore neprevăzute (erori tehnice, calibrare, resetare).</p> <p>Intervenții de urgență cu reacționarea în maxim 24 ore de la notificarea defecțiunii, problemei, timpul</p>	<p>DA Intervenții de urgență</p> <p>DA Lucrări de diagnosticare, testare, reparărie în cazul defecțiunilor minore neprevăzute (erori tehnice, calibrare, resetare).</p> <p>DA Intervenții de urgență cu reacționarea în maxim 24 ore de la notificarea defecțiunii, problemei, timpul</p>

<p>intervenției telefonică maxim 1 oră, soluționarea problemei nu mai mult de 72 ore de la notificare. Chemarea inginerului companiei poate fi în formă scrisă cât și telefonică.</p> <p>Numărul de intervenții la solicitarea beneficiarului nelimitate pe tot parcursul contractului încheiat.</p> <p>Intervenția trebuie să se soldeze cu dispozitivul reparat sau problema soluționată.</p> <p>Generarea din partea agentului economic a unui raport cu toate acțiunile de reparație, remediere interprinse și indicarea pieselor utilizate.</p> <p>Controlul prin verificare a dispozitivelor medicale</p> <ul style="list-style-type: none"> ▪ Verificare stare aparat (să nu aibă lovituri, crăpături, starea șuruburilor și prinderilor roților, etc.); ▪ Verificare parametrii tensiune de alimentare (tensiune, împământare, verificare întrerupători, etc.); ▪ Verificarea protecțiilor interne care asigură funcționarea în condiții de siguranță ale aparatului; ▪ Verificare conectori și cabluri; ▪ Măsurarea tensiunii din sursa de alimentare și din bateria de back up; ▪ Măsurarea rezistențelor diferitelor ansamble ale aparatului; ▪ Verificare și curățare filtre; ▪ Verificare și curățare ventilatoare de răcire; ▪ Verificare și calibrare ecran; ▪ Descărcare fișiere de loguri și erori; ▪ Verificare parametrii de protecție electrică conform EN 60601; ▪ Evaluarea parametrilor definiitorii de performanță, prin examinare și testare; 	<p>intervenției telefonică maxim 1 ore, soluționarea problemei nu mai mult de 72 ore de la notificare.</p> <p>DA Chemarea inginerului companiei poate fi în formă scrisă cât și telefonică.</p> <p>DA Numărul de intervenții la solicitarea (și cele de urgență) beneficiarului 10 (zece) pe tot parcursul contractului încheiat.</p> <p>DA Intervenția trebuie să se soldeze cu dispozitivul reparat (în cazul că acest lucru poate fi efectuat cu piesele care le detine deja beneficiarul final) sau problema soluționată sau recomandările de piese sau acesori care necesită a fi schimbate pentru o bună funcționare a dispozitivului medical.</p> <p>Dacă însă, defecțiunea prezintă o complexitate avansată, fiind necesar să se înlocuiască eventuale piese, acestea vor face obiectul unei oferte ulterioare. Piese de schimb normale și speciale ale sistemelor nu sunt incluse. Piese de schimb se vor achiziționa separat, iar costurile aferente cad în sarcina Beneficiarului.</p> <p>DA Generarea din partea agentului economic a unui raport cu toate acțiunile de reparație, remediere interprinse și indicarea pieselor utilizate.</p> <p>Controlul prin verificare a dispozitivelor medicale</p> <ul style="list-style-type: none"> ▪ DA Verificare stare aparat (să nu aibă lovituri, crăpături, starea șuruburilor și prinderilor roților, etc.); ▪ DA Verificare parametrii tensiune de alimentare (tensiune, împământare, verificare întrerupători, etc.); ▪ DA Verificarea protecțiilor interne care asigură funcționarea în condiții de siguranță ale aparatului; ▪ DA Verificare conectori și cabluri; ▪ DA Măsurarea tensiunii din sursa de alimentare și din bateria de back up; ▪ DA Măsurarea rezistențelor diferitelor ansamble ale aparatului; ▪ DA Verificare și curățare filtre; ▪ DA Verificare și curățare ventilatoare de răcire; ▪ DA Verificare și calibrare ecran; ▪ DA Descărcare fișiere de loguri și erori; ▪ DA Verificare parametrii de protecție electrică conform EN 60601; - Doar dacă acest lucru va fi necesar în urma diagnosticului efectuat de către inginerul specializat. ▪ DA Evaluarea parametrilor definiitorii de performanță, prin examinare și testare;
---	--

<ul style="list-style-type: none"> ■ Verificarea îndeplinirii setului de criterii de acceptabilitate pentru dispozitivul medical (valori impuse, limite specificate, accesorii etc.). ■ Verificarea și reglarea părților mecanice aflate în mișcare; ■ Eliminarea jocurilor la părțile mecanice; ■ Curățarea și gresarea părților mecanice aflate în mișcare; ■ Curățarea plăcilor electronice (dacă este cazul), precum și a altor componente; ■ Verificarea componentelor pneumaticice (acolo unde este cazul). 	<ul style="list-style-type: none"> ■ DA Verificarea îndeplinirii setului de criterii de acceptabilitate pentru dispozitivul medical (valori impuse, limite specificate, accesorii etc.). ■ DA Verificarea și reglarea părților mecanice aflate în mișcare; ■ DA Eliminarea jocurilor la părțile mecanice; ■ DA Curățarea și gresarea părților mecanice aflate în mișcare; ■ DA Curățarea plăcilor electronice (dacă este cazul), precum și a altor componente; ■ DA Verificarea componentelor pneumaticice (acolo unde este cazul). <p>DA Vor fi asigurate lucrări de întreținere a dispozitivului medical solicitat și lucrări pentru toate dispozitivele aferente care sunt în legătură directă cu dispozitivul medical, sau accesorii. Înlăturarea tuturor defecțiunilor depistate, tehnice cât și cele de program.</p> <p>- Dacă însă, defecțiunea prezintă o complexitate avansată, fiind necesar să se înlocuiască eventuale piese, acestea vor face obiectul unei oferte ulterioare. Piese de schimb normale și speciale ale sistemelor nu sunt incluse. Piese de schimb se vor achiziționa separat, iar costurile aferente cad în sarcina Beneficiarului.</p>
---	--

Maintenance instructions

Euroklav® 23 VS+, 29 VS+

Euroklav® 23 V-S, 29 V-S

Steam sterilizer

EN

This device is to be maintained exclusively by a qualified service technician trained by MELAG and working in accordance with the valid directives.

MELAG Medizintechnik

Geneststraße 6-10
10829 Berlin
Germany

Email: info@melag.com
Web: www.melag.com

WA_23VS+_29VS+_23VS_29VS_EN | Rev. 15 - 24/2445 | Modification date: 2024-10-02

Contents

General guidelines	3
Maintenance intervals	3
Safety instructions	3
Note on complaints	3
Tools/resources.....	4
1 Preparations	5
1.1 Performing the vacuum test	5
1.2 Outputting the logs	5
1.3 Checking the software version	5
1.4 Checking the function of the float switch.....	5
1.5 Emptying the internal storage tank.....	5
1.6 Cleaning the internal storage tank	5
2 Water treatment unit	6
2.1 Maintenance.....	6
2.2 Checking the inlet hose	6
2.3 Checking the outlet hose (if present)	6
3 Working in accordance with the “Manufacturer's recommendation for regular safety inspection” on MELAG pressure devices	7
4 Static check / functionality	7
4.1 Checking the sterilization chamber, chamber filter and tray mount	7
4.2 Pressure release filter	7
4.3 Replacing the water filter for internal water drain hoses	8
4.4 Checking the door hinges for play.....	8
4.5 Checking/replacing the lock slider and locking bolt.....	8
4.6 Checking the door lock slider	9
4.7 Checking the electrical door locking mechanism	9
4.8 Checking the distance of door bar – locking block.....	9
4.9 Checking the snap rings of the door hinge bolts	10
4.10 Checking the door seal	10
4.11 Checking the contact pressure of the door	10
4.12 Checking the tubular heating element.....	10
4.13 Checking the sensor on the capillary tube regulator	10
4.14 Replacing the sterile filter.....	10
4.15 Checking all electrical cable connections.....	10
4.16 Checking all hoses	11
4.17 Checking the device alignment	11
4.18 Cleaning the device interior.....	11
5 Function check	11
5.1 Checking/adjusting the door contact switch	11
5.2 Program run of vacuum test.....	12
5.3 Quick-Program run with type 5 indicator in accordance with EN ISO 11140-1	12
6 Electrical test in accordance with EN 50678 (VDE 0701) or national standard	12
7 Resetting the maintenance counter	12

General guidelines

Symbol	Description
	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 24 months at the latest. If the device is freely accessible, the maintenance takes around 2 hours plus test run and possible work not included in the regular maintenance plan.

Safety instructions



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 maintenance may be performed only by authorised technicians.
- Before opening the device, switch off at the power switch and remove the plug.
- 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 or in idle state. Switch off the device at the power switch and remove the cable before touching the live parts.
- Determine the absence of voltage at all poles.
- When working on or in the device, watch out for sharp edges and wear protective gloves to avoid cuts.



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. ME70036)

Article	Qty	Art. no.
Sterile filter	1	ME20160
Bulkhead plate seal	1	ME20090
Sliding grease for door locks, cartridge 1.5 g	1	ME24365
Seal for pressure release filter sieve insert (green flat seal) (up to serial number 201923V-S1400, 201929V-S1122)	1	ME35111
Seal, sieve insert for pressure release filter I & II (from serial number 201923V-S1401, 201929V-S1123)	1	ME21944
Spatula	1	--

Optionally required articles

Article	Qty	Art. no.
Water filter for internal water drain hose	1	ME30820
Seal for wastewater hose	1	ME52400
Spring loaded safety valve (3 bar)	1	ME20944
Chamber filter (vacuum)	1	ME38150
Filter with condensate return	1	ME34011
Door seal	1	ME58512
Door mirror (inner door panel)	1	ME22000
Door lock slider	1	ME70231
Sieve insert for pressure release filter (from serial number 201923V-S1400, 201929V-S1122)	2	ME35110
Sieve insert for pressure release filter I & II (from serial number 201923V-S1401, 201929V-S1123)	2	ME21945
PUR hose, black (6/4 mm)	1	ME28820

Tools

- Spring gauge
- hand vacuum cleaner
- Cleaning cloth
- rubbing alcohol or spirit
- Indicator system according to EN 867-5
- Threadlocker Loctite 272
- Standard tool set
- Repair tool receptacles (art. no. ME21916)

Additionally applicable documents

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

- Maintenance record (doc. WP_23VS+_29VS+_23VS_29VS_EN, rev. 3)
- Manufacturer's recommendation for electrical test during initial commissioning, after maintenance or repair (doc. ME_001-16)
- Manufacturer's recommendation for regular safety inspection MELAG pressure devices (doc. ME_003-16)
- Manufacturer's recommendation for renewed performance qualification after replacing components (doc. ME_004-20)
- Instructions for removing the door cover (doc. AS_013-13)
- Instructions for replacing the lock slider (doc. AS_007-07)
- Instructions for replacing in the door lock (doc. AS_006-07)
- Fitting the door seal (doc. IA_01-01)
- Instructions for setting the door contact pressure (doc. JA_002-13)
- Resetting the maintenance counter (doc. PW_D_23B_23S_23VS_24B_24V_25C_29S_29VS_30B_31B)
- Instruction manual for spring loaded safety valves (doc. BA_FSV)
- Blade receptacles: Handling and repairing (doc. AS_017-18)

1 Preparations

1.1 Performing the vacuum test

- ▶ If possible, the user should run 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.

1.2 Outputting the logs

1. All logs, including the malfunction logs and system and status logs are to be outputted for diagnosis purposes.
2. Evaluate the logs to detect any maintenance-relevant malfunctions.
3. Save the outputted logs.

1.3 Checking the software version



PLEASE NOTE

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

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

1.4 Checking the function of the float switch

- ▶ In **Diagnosis > DIN: Digital inputs > E6: Feed water, float**, check the float switches to ensure that they are switching correctly.

1.5 Emptying the internal storage tank

- ▶ Empty the internal storage tank on both sides.

1.6 Cleaning the internal storage tank

- ▶ Clean the internal storage tank with spirit or alcohol.

2 Water treatment unit

2.1 Maintenance

If a water treatment unit exists and is connected, maintain this as well.

1. Before beginning with maintenance of the water treatment unit ask the doctor or the users regarding conspicuous matters or problems regarding the device. Insufficient conductivity and resulting more frequent replacement of the mixed-bed resin cartridge, frequently low feedwater or high water consumption indicate a fault.
2. If the steam sterilizer feedwater is supplied via a water treatment unit, this must be maintained as described in its user manual/test protocol.
3. In the event of problems during operation, rectify the malfunction with the aid of the water treatment unit test protocol.

2.2 Checking the inlet hose

Check the inlet hose for feed water for leaks, crushing, kinks and age-related embrittlement or swelling as follows:

1. Dismantle the inlet hose at the steam sterilizer.
2. Pull off the union nut.
3. Shorten the dismantled inlet hose by approx. 5 mm if it has swollen.
4. Fit the union nut on the inlet hose.

Replace the feed water inlet hose (art. no. ME28820) after six years at the latest.



PLEASE NOTE

MELAG recommends that the date of the last replacement be noted on the hoses or in the device immediately, to ensure that the following replacement is carried out in good time.

- Notify the operator if the inlet hose is not replaced after six years.

2.3 Checking the outlet hose (if present)

1. Replace the outlet hose seal (art. no. ME52400) and, if present, retighten the hose clamps.
2. Check the outlet hose for leaks.
3. Check the outlet hose to ensure that it is kink-free and continuously falling (without rising or bagging).

3 Working in accordance with the “Manufacturer's recommendation for regular safety inspection” on MELAG pressure devices

- ▶ Carry out the work as described in the separate document “Manufacturer's recommendation for regular safety inspection MELAG pressure devices”.
- ▶ Check the date of the last replacement of the spring-loaded safety valve and replace the spring-loaded safety valve (art. no. ME20944, not included in the maintenance set) if necessary, see “Operating instructions for spring-loaded safety valves”. The replacement interval amounts to two years.



PLEASE NOTE

MELAG recommends that the date of the last replacement always be noted on the valve or in the device, to ensure that the following replacement is carried out in good time.

4 Static check / functionality

1. Open the door.



WARNING

Danger of electric shock from live components!

In order to perform the following maintenance steps, it is necessary to remove the housing parts.

- Switch off the device power switch and disconnect the power plug.
- Determine the absence of voltage on all poles.

2. Remove housing parts.

4.1 Checking the sterilization chamber, chamber filter and tray mount

1. Check the sterilization chamber and tray mount for soiling / flash rust.
2. Check the chamber filter (art. no. ME38150, not included in the maintenance set) and “Filter with condensate return” (art. no. ME34011, not included in the maintenance set) for soiling; clean or replace if necessary.

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



PLEASE NOTE

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

4.2 Pressure release filter

1. Open the pressure release filter and, depending on the type, replace the seal with the suitable seals – green flat seal (art. no. ME35111) or O-ring (art. no. ME21944).
2. Check the sieve insert, depending on the type (art. no. ME35110 or ME21945, not included in the maintenance set) for soiling; clean it and replace it if necessary. The sieve insert is at the back, below the sterilization chamber. To remove the sieve insert, it may be necessary to remove the rear panel of the device and unscrew the cap nut.



PLEASE NOTE

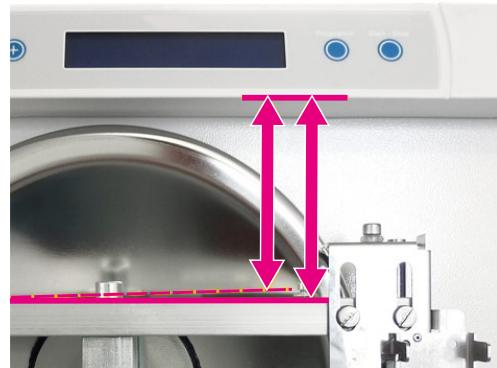
A small amount of water may come out.

4.3 Replacing the water filter for internal water drain hoses

- If the water drains only slowly or not at all when emptying the internal water tank, replace the relevant water filter (art. no. ME30820, not included in the maintenance set) for the internal water drain hose.

4.4 Checking the door hinges for play

1. Remove the door cover, see separate instructions "Instructions for removing the door panel".
2. With the door slightly ajar (setting without plastic casing), measure the distance between the right upper edge of the door bar and display lower edge in its "hanging" and "lifted" state. The difference should amount to max. 3 mm. Replace wearing parts if necessary, see also "Manufacturer's recommendation for regular safety inspection MELAG pressure devices".



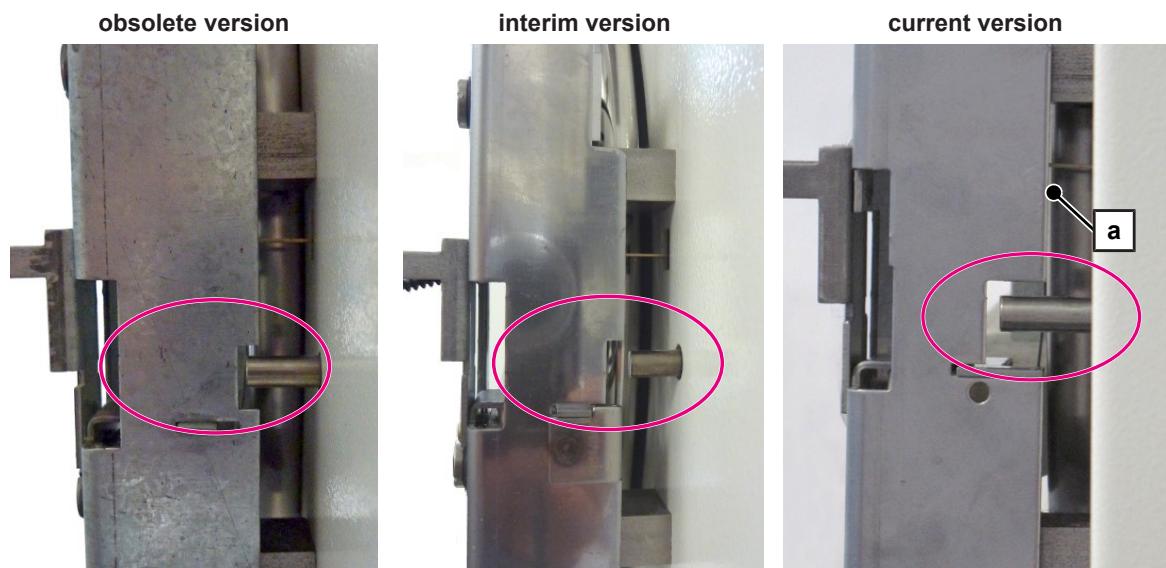
4.5 Checking/replacing the lock slider and locking bolt



PLEASE NOTE

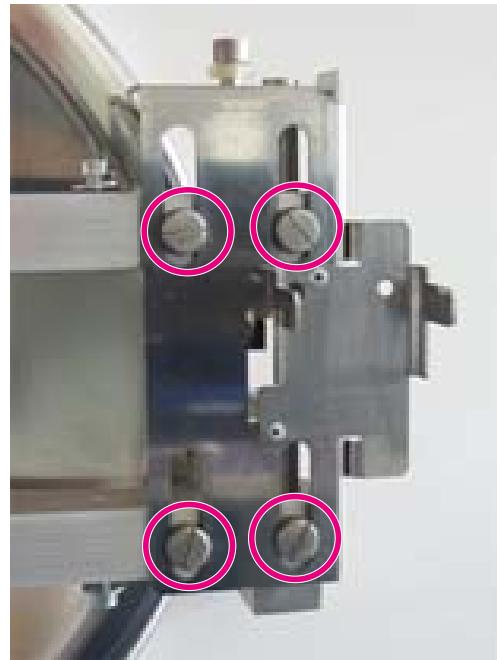
Only applies to devices built up to and including 2006.

1. Check steam sterilizers built up to and including 2006 to see whether the current version of the locking slider and the locking bolt is present (see figure). If this is not the case, it is necessary to retrofit to the current version (art. no. ME70231, not included in the maintenance set) and to replace the inner door panel (pos. a / art. no. ME22000, not included in the maintenance set), see "Instructions for replacing the lock slider".
2. Finally lubricate with MELAG grease (art. no. ME24365). A spatula for applying the grease is included in the maintenance set.



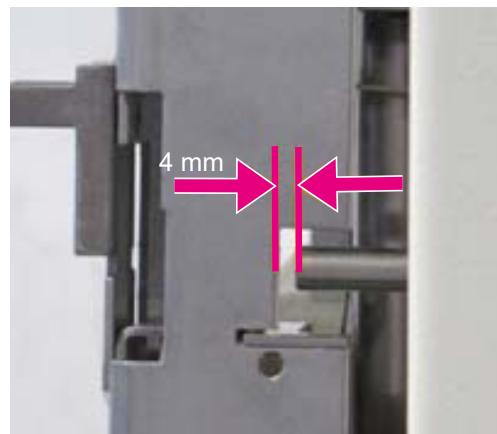
4.6 Checking the door lock slider

- ▶ Check the door lock for wear/defects and grease the locking bolts with MELAG grease (art. no. ME24365). A spatula for applying the grease is included in the maintenance set. Replace defective or damaged parts. Check the four fastening screws to ensure that they are firmly seated.



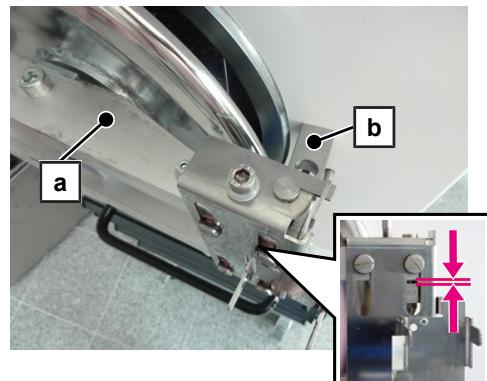
4.7 Checking the electrical door locking mechanism

- ▶ The distance between the door lock slider and the locking pin must be 4 ± 1 mm (see separate set of instructions "Instructions for replacing the door lock" in the section "Adjusting the door lock").



4.8 Checking the distance of door bar – locking block

- ▶ The distance between the lower edge of the door bar (pos. a) and the upper edge of the locking block (pos. b) must be min. 0.5 mm and max. 1.5 mm (see "Instructions for replacing the lock slider").



4.9 Checking the snap rings of the door hinge bolts

The door hinge pins on the top and bottom must be secured against unintentional sliding with snap rings.

- ▶ Check that the snap rings on the top and bottom are in place.

4.10 Checking the door seal

1. Refit the door panel.
2. Check the door seal for damages and clean it with a mild, commercially-available fluid cleaning agent. If necessary, exchange the door seal (art. no. ME58512, not included in the maintenance set), see the separate set of instructions "Fitting the door seal".
3. Clean the sealing groove of the round blank with a mild, commercially-available fluid cleaning agent (pH value 5-8) or spirit. Do not use a cleaning agent which could damage the surface of the round blank.

4.11 Checking the contact pressure of the door

- ▶ Check the contact pressure of the door and adjust if necessary (see separate set of instructions "Instructions for setting the door contact pressure").

4.12 Checking the tubular heating element

1. Remove the cover over the tubular heating element in the sterilization chamber and clean it.
2. Clean the sterilization chamber under the tubular heating element.
3. Replace the seal on the cover plate (art. no. ME20090).
4. Check whether the front fixing clamp of the tubular heating element can move a little. If necessary, loosen the nuts slightly and lock them again so that the tubular heating element can expand forwards during heating.

4.13 Checking the sensor on the capillary tube regulator

- ▶ Check the sensors of the capillary tube regulators for correct position at the tubular heater. The sensors are correctly mounted if their strain reliefs (5 mm at the end) project from the guide tubes.



PLEASE NOTE

Both capillary tube regulators must protrude equidistantly.

4.14 Replacing the sterile filter

- ▶ Replace the sterile filter (art. no. ME20160).

4.15 Checking all electrical cable connections



NOTICE

Risk of damage to the device!

Failure to comply with these safety instructions can result in damage or can compromise safety.

- The cables may not be permitted to come into contact with any of the parts which could become hot during operation, e.g. the sterilization chamber.

1. Check all cable connections for stability, damage and correct installation.
2. If necessary, tighten and correct their installation. The cables may not be permitted to come into contact with any of the parts which could become hot during operation (e.g. the sterilization chamber).
3. Check the control electronics for stability and damage.

4. Check the stability of the plug connections, the fuses and the connections of the overheating protection.
5. Check all cable connections, especially the power conducting flat plug connections outlined in the following section, for stability:
 - Power switch
 - Mains fuse
 - Supply voltage on the control electronics of the electrical control
 - Outputs tubular heating element (ACOUT1), preheater (ACOUT2) on the control electronics
 - Connecting plug of the tubular heating element
 - Overheat protection switch tubular heating element
 - Overheat protection switch preheater
 - Rectifier plug screw fittings on the solenoid valves

4.16 Checking all hoses

1. Check all hoses in the device for damage or abrasion following vibration. Check that they are all in the correct position.
2. Check for limescale or water residue in the device. These are indications of leaks in the hose connections.
3. Check all hose screw connections for stability. Tighten any loose hose screw connections by hand and then with an open-end wrench for max. 1/2 revolution.

4.17 Checking the device alignment

► Check the device alignment as follows: Starting with the device in a level position and proceeding from the chamber sealing surface, the front device feet of the Euroklav 23V-S/23 VS+ must be unscrewed by five rotations and the Euroklav 29V-S/29 VS+ by three rotations. This ensures that the residual water / condensate in the sterilization chamber can drain off.

4.18 Cleaning the device interior

1. Encrusted water stains and limescale residues indicate leaks. Find and remedy the leaks. Remove water stains and limescale residues in order to recognise leaks (new deposits will form) during the next maintenance.
2. Free the steam sterilizer interior of dust, e.g. with a vacuum cleaner or a damp cloth. The vacuum pump and the cooling slots of the base plate must remain clean in order to ensure the long-term performance of the device.

5 Function check

5.1 Checking/adjusting the door contact switch

1. Insert the mains plug of the steam sterilizer into the socket and switch on at the mains switch.
2. In **Diagnosis**, navigate to **DIN: Digital inputs E1: Door-contact closed**. There, the clearance from the switching of the door contact switch (display indicator **E1: Door-contact closed**) to the lower stop of the lock slider must be 1-2 mm.

5.2 Program run of vacuum test

1. Run the program **vacuum test** with a cold device and compare the results with the vacuum test already performed.
2. During the test run, listen for unusual noises (especially during evacuation, e.g. loose parts rattling when vibrating or unusual noises from the vacuum pump). Should unusual noises be heard from the vacuum pump, the pump may need to be replaced.
3. Attach the log printout. Note the leakage rate and evacuation time from the log printout and record it in the maintenance record.
4. The max. evacuation time for the Euroklav 23V-S/23 VS+ is 3:40 min and for the Euroklav 29V-S/29 VS+ 3:00 min. If this time is exceeded, check the device for leaks and wear of the vacuum pump.
5. The recommended leakage rate is below 0.8 mbar/min. If this value is slightly exceeded, but is still below 1.0 mbar/min, this is only acceptable if the type 5 indicator has successfully changed colour during the Quick-Program, which is to be carried out subsequently. In this case, the customer must be informed; should the leakage deteriorate, it must be repaired.
6. If the leakage rate exceeds 1.0 mbar/min or the indicator test is not successful, then the device must be checked for leaks and the function of the valves.
7. Seal any leaks with a threadlocker Loctite 272 (if all else fails, use a Teflon strip).

5.3 Quick-Program run with type 5 indicator in accordance with EN ISO 11140-1

1. Carry out a test run of the Quick-Program with type 5 indicator and, if possible, with an unpacked load. To save time, it is possible to interrupt the drying phase after 2 min.
2. With a connection (via siphon) to the wastewater system: Check the correct installation of the water outlet hose during the test run.
3. Perform an acoustic check for unusual noises during the test run, e.g. the banging of loose components upon the vibration of the vacuum pump.
4. Attach the log printout of the program run to the maintenance record.
5. Attach the indicator strip to the separate maintenance record.

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

1. Replace the device covers.
2. After closing the device, perform an electrical test according to EN 50678 (VDE 0701). Comply with the applicable national specifications.
3. 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

For more information, see "Manufacturer's recommendation for electrical test during initial commissioning, after maintenance or repair".

7 Resetting the maintenance counter

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



PLEASE NOTE

Complete and sign the maintenance record as evidence of proper maintenance.

Observe the information in the maintenance record.

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.

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 cartridge	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)

Table of contents

1	Preparations.....	7
1.1.	Perform a vacuum test.....	7
1.2.	Check the state of the software	7
2.	Working in accordance with the “Recommendation for recurrent testing on pressure devices”.....	7
3.	Maintenance of the water treatment unit MELAdem 55 (optional).....	7
4.	Maintenance of the steam sterilizer - static checks / functionality.....	8
4.1.	Chamber and mount	8
4.2.	Pressure switch door lock.....	8
4.3.	Cooling water inflow and outlet hose	8
4.4.	Cooling water and feed water intake filter	8
4.5.	Door seal	8
4.6.	Door and door lock	8
4.7.	Door contact switch	9
4.8.	Sterile filter.....	10
4.9.	Fine filter and cavitation protection nozzle	10
4.10.	Steam generator	10
4.11.	Mains filter	10
4.12.	Steam generator relays	10
4.13.	Check all hoses	10
4.14.	Check the electrical cable connections.....	10
4.15.	Cleaning the interior of the device	11
4.16.	Cooling water quantity	11
5.	Parameter alterations (only up to SN 1125-C1020).....	11
5.1.	Conductivity threshold values	11
6.	Function check	11
6.1.	Perform a vacuum test.....	11
6.2.	Leakage search (only where leakage rate is too high / problems with the Bowie & Dick test).....	11
6.3.	Flow monitor / query of the float switch.....	12
6.4.	Pressure switch cooling water / leakage water detector (optional)	12
6.5.	Program run “Bowie & Dick test” with test body system according to EN 867-5.....	12
7.	Electrical check	12
8.	Resetting the maintenance counter	12

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

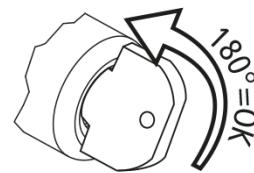
Check the door including all locking components as well as the electromotive door lock according to the separate set of instructions for correct adjustment, wear or defects. Check the compliance of the required tolerances.

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.



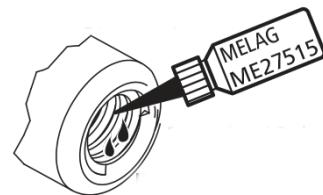
4. Insert the test gauge into the lock nut to the stop and turn it 180°. If this is not possible or resistance can be felt, the lock nut is worn.
5. Clean the locking spindle completely and check for damages.
6. Given damage or wear, replace the locking spindle (art. no. ME70202) and/or the lock nut (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 generator. 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. $\frac{1}{2}$ 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".
 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 to the 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 **Vacuum 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.

Maintenance instructions

Euroklav® 23 S+

Euroklav® 23-S, 29-S

Steam sterilizer

EN

This device is to be maintained exclusively by a qualified service technician trained by MELAG and working in accordance with the valid directives.

MELAG Medizintechnik

Geneststraße 6-10
10829 Berlin
Germany

Email: info@melag.com
Web: www.melag.com

WA_23S+_23-S_29-S_EN | Rev. 15 - 24/2448 | Modification date: 2024-10-02

Contents

General guidelines	3
Maintenance intervals	3
Safety instructions	3
Note on complaints	3
Tools/resources	4
1 Preparations	5
1.1 Outputting the logs	5
1.2 Checking the software version	5
1.3 Checking the function of the float switch	5
1.4 Emptying the internal storage tank	5
1.5 Cleaning the internal storage tank	5
2 Water treatment unit	5
2.1 Maintenance	5
2.2 Checking the inlet hose	6
2.3 Checking the outlet hose (if present)	6
3 Working in accordance with the “Manufacturer's recommendation for regular safety inspection” on MELAG pressure devices	6
4 Static check / functionality	7
4.1 Checking the sterilization chamber, chamber filter and tray mount	7
4.2 Pressure release filter	7
4.3 Replacing the water filter for internal water drain hoses	7
4.4 Checking the door hinges for play	8
4.5 Checking/replacing the lock slider and locking bolt	8
4.6 Checking the door lock slider	9
4.7 Checking the electrical door locking mechanism	9
4.8 Checking the distance of door bar – locking block	9
4.9 Checking the snap rings of the door hinge bolts	10
4.10 Checking the door seal	10
4.11 Checking the contact pressure of the door	10
4.12 Checking the tubular heating element	10
4.13 Checking the sensor on the capillary tube regulator	10
4.14 Replacing the sterile filter	10
4.15 Checking all electrical cable connections	10
4.16 Checking all hoses	11
4.17 Checking the device alignment	11
4.18 Cleaning the device interior	11
5 Function check	11
5.1 Checking/adjusting the door contact switch	11
5.2 Pressure pump	12
5.3 Quick-Program run with type 5 indicator in accordance with EN ISO 11140-1	12
6 Electrical test in accordance with EN 50678 (VDE 0701) or national standard	12
7 Resetting the maintenance counter	12

General guidelines

Symbol	Description
	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 24 months at the latest. If the device is freely accessible, the maintenance takes around 2 hours plus test run and possible work not included in the regular maintenance plan.

Safety instructions



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 maintenance may be performed only by authorised technicians.
- Before opening the device, switch off at the power switch and remove the plug.
- 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 or in idle state. Switch off the device at the power switch and remove the cable before touching the live parts.
- Determine the absence of voltage at all poles.
- When working on or in the device, watch out for sharp edges and wear protective gloves to avoid cuts.



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. ME70035)

Article	Qty.	Art. no.
Sterile filter	1	ME20160
Bulkhead plate seal	1	ME20090
Sliding grease for door locks, cartridge 1.5 g	1	ME24365
Seal for pressure release filter sieve insert (green flat seal) (up to serial number 201923-S1070)	1	ME35111
Seal, sieve insert for pressure release filter I & II (from serial number 201923-S1071)	1	ME21944
Spatula	1	--

Optionally required articles

Article	Qty.	Art. no.
Water filter for internal water drain hose	1	ME30820
Seal for wastewater hose	1	ME52400
Spring loaded safety valve (3 bar)	1	ME20944
Chamber filter (flow filter)	1	ME38150
Filter with condensate return	1	ME34011
Door seal	1	ME58512
Door mirror (inner door panel)	1	ME22000
Sieve insert for pressure release filter (up to serial number 201923-S1070)	2	ME35110
Sieve insert for pressure release filter I & II (from serial number 201923-S1071)	2	ME21945
PUR hose, black (6/4 mm)	1	ME28820

Tools

- Spring gauge
- hand vacuum cleaner
- Cleaning cloth
- rubbing alcohol or spirit
- Indicator system according to EN 867-5
- Threadlocker Loctite 272
- Standard tool set
- Repair tool receptacles (art. no. ME21916)

Additionally applicable documents

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

- Maintenance record (doc. WP_23S+_23S_29S_EN, rev. 3)
- Manufacturer's recommendation for electrical test during initial commissioning, after maintenance or repair (doc. ME_001-16)
- Manufacturer's recommendation for regular safety inspection MELAG pressure devices (doc. ME_003-16)
- Manufacturer's recommendation for renewed performance qualification after replacing components (doc. ME_004-20)
- Instructions for removing the door cover (doc. AS_013-13)
- Instructions for replacing the lock slider (doc. AS_007-07)
- Instructions for replacing in the door lock (doc. AS_006-07)
- Fitting the door seal (doc. IA_01-01)
- Instructions for setting the door contact pressure (doc. JA_002-13)
- Resetting the maintenance counter (doc. PW_D_23B_23S_23VS_24B_24V_25C_29S_29VS_30B_31B)
- Instruction manual for spring loaded safety valves (doc. BA_FSV)

- Blade receptacles: Handling and repairing (doc. AS_017-18)

1 Preparations

1.1 Outputting the logs

1. All logs, including the malfunction logs and system and status logs are to be outputted for diagnosis purposes.
2. Evaluate the logs to detect any maintenance-relevant malfunctions.
3. Save the outputted logs.

1.2 Checking the software version



PLEASE NOTE

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

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

1.3 Checking the function of the float switch

- ▶ In **Diagnosis > DIN: Digital inputs > E6: Feed water, float**, check the float switches to ensure that they are switching correctly.

1.4 Emptying the internal storage tank

- ▶ Empty the internal storage tank on both sides.

1.5 Cleaning the internal storage tank

- ▶ Clean the internal storage tank with spirit or alcohol.

2 Water treatment unit

2.1 Maintenance

If a water treatment unit exists and is connected, maintain this as well.

1. Before beginning with maintenance of the water treatment unit ask the doctor or the users regarding conspicuous matters or problems regarding the device. Insufficient conductivity and resulting more frequent replacement of the mixed-bed resin cartridge, frequently low feedwater or high water consumption indicate a fault.
2. If the steam sterilizer feedwater is supplied via a water treatment unit, this must be maintained as described in its user manual/test protocol.
3. In the event of problems during operation, rectify the malfunction with the aid of the water treatment unit test protocol.

2.2 Checking the inlet hose

Check the inlet hose for feed water for leaks, crushing, kinks and age-related brittleness or swelling as follows:

1. Dismantle the inlet hose at the steam sterilizer.
2. Pull off the union nut.
3. Shorten the dismantled inlet hose by approx. 5 mm if it has swollen.
4. Fit the union nut on the inlet hose.

Replace the feed water inlet hose (art. no. ME28820) after six years at the latest.



PLEASE NOTE

MELAG recommends that the date of the last replacement be noted on the hoses or in the device immediately, to ensure that the following replacement is carried out in good time.

- Notify the operator if the inlet hose is not replaced after six years.

2.3 Checking the outlet hose (if present)

1. Replace the outlet hose seal (art. no. ME52400) and, if present, retighten the hose clamps.
2. Check the outlet hose for leaks.
3. Check the outlet hose to ensure that it is kink-free and continuously falling (without rising or bagging).

3 Working in accordance with the “Manufacturer's recommendation for regular safety inspection” on MELAG pressure devices

- ▶ Carry out the work as described in the separate document “Manufacturer's recommendation for regular safety inspection MELAG pressure devices”.
- ▶ Check the date of the last replacement of the spring-loaded safety valve and replace the spring-loaded safety valve (art. no. ME20944, not included in the maintenance set) if necessary, see “Operating instructions for spring-loaded safety valves”. The replacement interval amounts to two years.



PLEASE NOTE

MELAG recommends that the date of the last replacement always be noted on the valve or in the device, to ensure that the following replacement is carried out in good time.

4 Static check / functionality

1. Open the door.



WARNING

Danger of electric shock from live components!

In order to perform the following maintenance steps, it is necessary to remove the housing parts.

- Switch off the device power switch and disconnect the power plug.
- Determine the absence of voltage on all poles.

2. Remove housing parts.

4.1 Checking the sterilization chamber, chamber filter and tray mount

1. Check the sterilization chamber and tray mount for soiling / flash rust.
2. Check the chamber filter (art. no. ME38150, not included in the maintenance set) and "Filter with condensate return" (art. no. ME34011, not included in the maintenance set) for soiling; clean or replace if necessary.

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



PLEASE NOTE

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

4.2 Pressure release filter

1. Open the pressure release filter and, depending on the type, replace the seal with the suitable seals – green flat seal (art. no. ME35111) or O-ring (art. no. ME21944).
2. Check the sieve insert, depending on the type (art. no. ME35110 or ME21945, not included in the maintenance set) for soiling; clean it and replace it if necessary. The sieve insert is at the back, below the sterilization chamber. To remove the sieve insert, it may be necessary to remove the rear panel of the device and unscrew the cap nut.



PLEASE NOTE

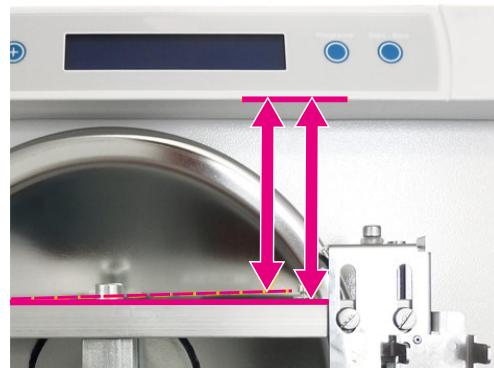
A small amount of water may come out.

4.3 Replacing the water filter for internal water drain hoses

- If the water drains only slowly or not at all when emptying the internal water tank, replace the relevant water filter (art. no. ME30820, not included in the maintenance set) for the internal water drain hose.

4.4 Checking the door hinges for play

1. Remove the door cover, see separate instructions "Instructions for removing the door panel".
2. With the door slightly ajar (setting without plastic casing), measure the distance between the right upper edge of the door bar and display lower edge in its "hanging" and "lifted" state. The difference should amount to max. 3 mm. Replace wearing parts if necessary, see also "Manufacturer's recommendation for regular safety inspection MELAG pressure devices".



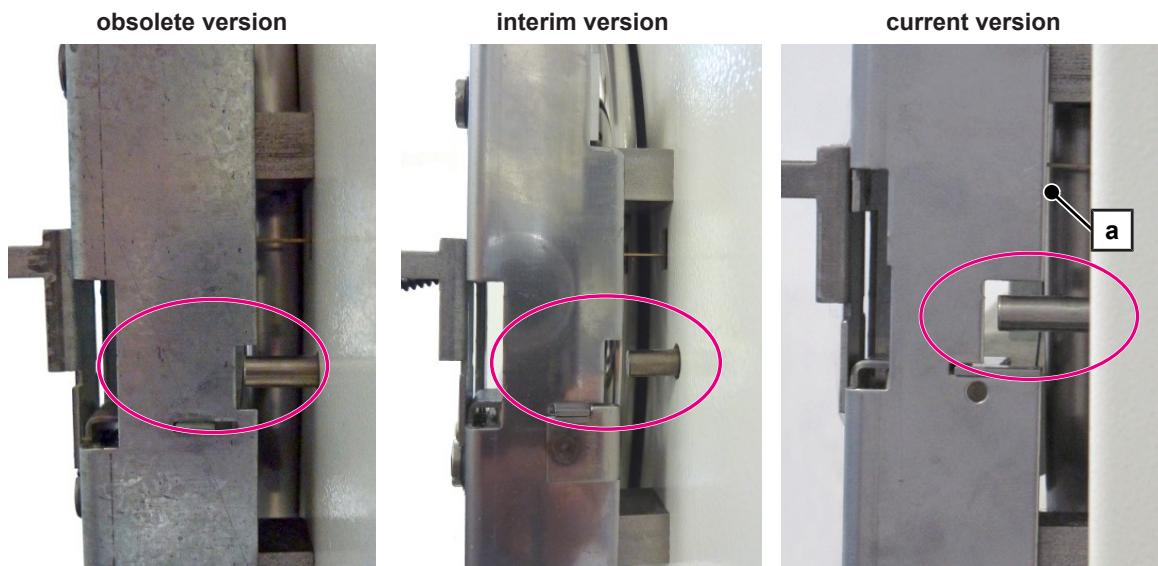
4.5 Checking/replacing the lock slider and locking bolt



PLEASE NOTE

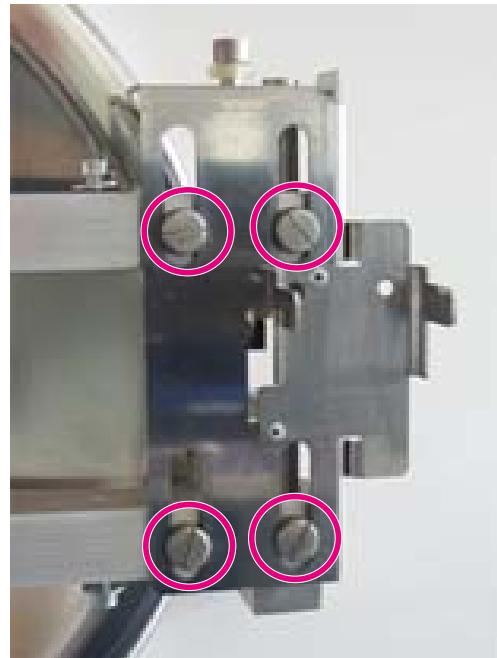
Only applies to devices built up to and including 2006.

1. Check steam sterilizers built up to and including 2006 to see whether the current version of the locking slider and the locking bolt is present (see figure). If this is not the case, it is necessary to retrofit to the current version (art. no. ME70231, not included in the maintenance set) and to replace the inner door panel (pos. a / art. no. ME22000, not included in the maintenance set), see "Instructions for replacing the lock slider".
2. Finally lubricate with MELAG grease (art. no. ME24365). A spatula for applying the grease is included in the maintenance set.



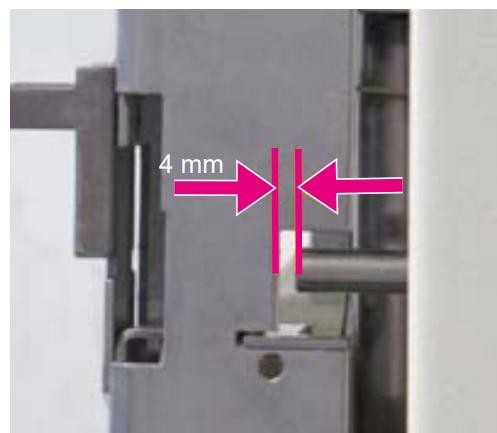
4.6 Checking the door lock slider

- ▶ Check the door lock for wear/defects and grease the locking bolts with MELAG grease (art. no. ME24365). A spatula for applying the grease is included in the maintenance set. Replace defective or damaged parts. Check the four fastening screws to ensure that they are firmly seated.



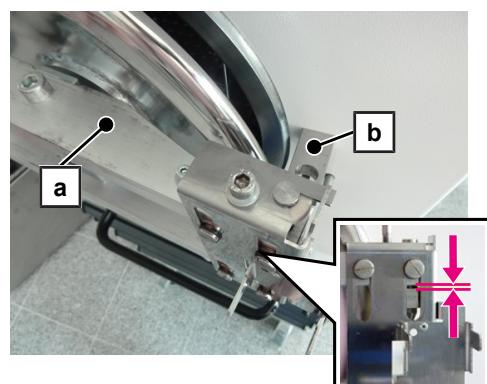
4.7 Checking the electrical door locking mechanism

- ▶ The distance between the door lock slider and the locking pin must be 4 ± 1 mm (see separate set of instructions "Instructions for replacing the door lock" in the section "Adjusting the door lock").



4.8 Checking the distance of door bar – locking block

- ▶ The distance between the lower edge of the door bar (pos. a) and the upper edge of the locking block (pos. b) must be min. 0.5 mm and max. 1.5 mm (see "Instructions for replacing the lock slider").



4.9 Checking the snap rings of the door hinge bolts

The door hinge pins on the top and bottom must be secured against unintentional sliding with snap rings.

- ▶ Check that the snap rings on the top and bottom are in place.

4.10 Checking the door seal

1. Refit the door panel.
2. Check the door seal for damages and clean it with a mild, commercially-available fluid cleaning agent. If necessary, exchange the door seal (art. no. ME58512, not included in the maintenance set), see the separate set of instructions "Fitting the door seal".
3. Clean the sealing groove of the round blank with a mild, commercially-available fluid cleaning agent (pH value 5-8) or spirit. Do not use a cleaning agent which could damage the surface of the round blank.

4.11 Checking the contact pressure of the door

- ▶ Check the contact pressure of the door and adjust if necessary (see separate set of instructions "Instructions for setting the door contact pressure").

4.12 Checking the tubular heating element

1. Remove the cover over the tubular heating element in the sterilization chamber and clean it.
2. Clean the sterilization chamber under the tubular heating element.
3. Replace the seal on the cover plate (art. no. ME20090).
4. Check whether the front fixing clamp of the tubular heating element can move a little. If necessary, loosen the nuts slightly and lock them again so that the tubular heating element can expand forwards during heating.

4.13 Checking the sensor on the capillary tube regulator

- ▶ Check the sensors of the capillary tube regulators for correct position at the tubular heater. The sensors are correctly mounted if their strain reliefs (5 mm at the end) project from the guide tubes.



PLEASE NOTE

Both capillary tube regulators must protrude equidistantly.

4.14 Replacing the sterile filter

- ▶ Replace the sterile filter (art. no. ME20160).

4.15 Checking all electrical cable connections



NOTICE

Risk of damage to the device!

Failure to comply with these safety instructions can result in damage or can compromise safety.

- The cables may not be permitted to come into contact with any of the parts which could become hot during operation, e.g. the sterilization chamber.

1. Check all cable connections for stability, damage and correct installation.
2. If necessary, tighten and correct their installation. The cables may not be permitted to come into contact with any of the parts which could become hot during operation (e.g. the sterilization chamber).
3. Check the control electronics for stability and damage.

4. Check the stability of the plug connections, the fuses and the connections of the overheating protection.
5. Check all cable connections, especially the power conducting flat plug connections outlined in the following section, for stability:
 - Power switch
 - Mains fuse
 - Supply voltage on the control electronics of the electrical control
 - Outputs tubular heating element (ACOUT1), preheater (ACOUT2) on the control electronics
 - Connecting plug of the tubular heating element
 - Overheat protection switch tubular heating element
 - Overheat protection switch preheater
 - Rectifier plug screw fittings on the solenoid valves

4.16 Checking all hoses

1. Check all hoses in the device for damage or abrasion following vibration. Check that they are all in the correct position.
2. Check for limescale or water residue in the device. These are indications of leaks in the hose connections.
3. Check all hose screw connections for stability. Tighten any loose hose screw connections by hand and then with an open-end wrench for max. 1/2 revolution.

4.17 Checking the device alignment

► Check the device alignment as follows: Starting with the device in a level position and proceeding from the chamber sealing surface, the front device feet of the Euroklav 23 S+/23-S must be unscrewed by five rotations and the Euroklav 29-S by three rotations. This ensures that the residual water / condensate in the sterilization chamber can drain off.

4.18 Cleaning the device interior

1. Encrusted water stains and limescale residues indicate leaks. Find and remedy the leaks. Remove water stains and limescale residues in order to recognise leaks (new deposits will form) during the next maintenance.
2. Free the steam sterilizer interior of dust, e.g. with a vacuum cleaner or a damp cloth. The vacuum pump and the cooling slots of the base plate must remain clean in order to ensure the long-term performance of the device.

5 Function check

5.1 Checking/adjusting the door contact switch

1. Insert the mains plug of the steam sterilizer into the socket and switch on at the mains switch.
2. In **Diagnosis**, navigate to **DIN: Digital inputs E1: Door-contact closed**. There, the clearance from the switching of the door contact switch (display indicator **E1: Door-contact closed**) to the lower stop of the lock slider must be 1-2 mm.

5.2 Pressure pump



NOTICE

Failure to comply with these safety instructions can result in damage or can compromise safety.

- Before switching on the pressure pump, push the door locking grip down as far as it will go so that the door locking pin engages.

1. Evaluating/controlling the performance of the pressure pump: In the Diagnosis program, navigate to **ACOUT: AC outputs > A3: Pressure pump/A9: SV flow** and switch on the pressure pump and the solenoid valve flow.
2. Stop the time it takes to achieve an excess pressure of 2 bar. The max. permissible time for the pressure build-up is 3:00 min for 23-S/23 S+ and 2:30 min for 29-S. If this time is exceeded, then check the device for leaks, the function of the valves and, if necessary, wear of the pressure pump.

5.3 Quick-Program run with type 5 indicator in accordance with EN ISO 11140-1

1. Carry out a test run of the Quick-Program with type 5 indicator and, if possible, with an unpacked load. To save time, it is possible to interrupt the drying phase after 2 min.
2. With a connection (via siphon) to the wastewater system: Check the correct installation of the water outlet hose during the test run.
3. Perform an acoustic check for unusual noises during the test run, e.g. the banging of loose components upon the vibration of the pressure pump.
4. Attach the log printout of the program run to the maintenance record.
5. Attach the indicator strip to the separate maintenance record.

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

1. Replace the device covers.
2. After closing the device, perform an electrical test according to EN 50678 (VDE 0701). Comply with the applicable national specifications.
3. 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

For more information, see “Manufacturer's recommendation for electrical test during initial commissioning, after maintenance or repair”.

7 Resetting the maintenance counter

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



PLEASE NOTE

Complete and sign the maintenance record as evidence of proper maintenance.

Observe the information in the maintenance record.

User Manual

Autoclave

Cliniklav[®] 25

as of software version 5.15

Dear Dr.

We should like to extend our thanks for the expression of trust in our company which you have displayed through the purchase of this MELAG product.

As an owner-run and operated family concern founded in 1951, we have a long history of successful specialization in hygiene products for practice-based use. Our focus on innovation, quality and the highest standards of operational reliability has established MELAG as the world's leading manufacturer in the instrument treatment and hygiene field.

You, our customer are justified in your demand for the best products, quality and reliability. Providing **"competence in hygiene"** and **"Quality – made in Germany"**, we guarantee that these demands will be met. Our certified quality management systems is subject to close monitoring: one instrument to this end is our annual multi-day audit conducted in accordance with ISO 13485 and ISO 9001. This guarantees that all MELAG products are manufactured and tested in accordance with strict quality criteria.

The MELAG management and team.

CE 0197

User Manual Cliniklav®25

Valid for Cliniklav®25

Responsible for the contents:

MELAG Medizintechnik oHG
Geneststraße 6-10
10829 Berlin
Germany

E-Mail: info@melag.com
www.melag.com

Document: BA_2_GB_25C_v6.doc / Revision: 6 – 16/1560

Alteration date: 12-07-2016

Subjects to technical changes

To ensure the functional effectiveness of this unit and to preserve its value:

1. Prepare the instruments to be sterilized carefully
2. Take proper care of the autoclave
3. Use only pure distilled or demineralized water

CONTENTS

1 SAFETY INSTRUCTIONS	5
1.1 Symbols on the autoclave	6
2 DESCRIPTION OF THE UNIT	7
2.1 Views of the unit	7
2.2 Control panel	8
2.3 Performance features of this autoclave	9
2.3.1 Fractionating pulsed vacuum procedure	9
2.3.2 Programs for sterilization	9
2.3.3 Separate steam generation	9
2.3.4 One-way system/Conductivity measurement/Automatic water supply	9
2.3.5 Electronic Parameter Control (EPS)	9
2.3.6 Vacuum drying	9
2.3.7 Documentation	9
3 INSTALLATION AND INITIAL START-UP	10
3.1 Power supply	10
3.2 Connection of a water treatment unit	10
3.3 Vacuum test	10
3.4 Bowie & Dick test	12
3.5 Trial run	12
3.6 Record of installation and setting up	13
3.7 Validation	13
4 STERILIZATION	13
4.1 Supply with fresh purified feed water/cooling water	13
4.2 Preparation of instruments	13
4.3 Loading the autoclave	14
4.4 Program selection	15
4.5 Pre-heating	16
4.6 Selecting extra drying	16
4.7 Opening and closing the autoclave door	16
4.8 Program start	16
4.9 Program progress	17
4.10 Manual termination of program	18
4.10.1 Terminate before beginning of drying	18
4.10.2 Terminate during drying	19
4.11 Removing the sterilized items	20
4.12 Sterile storage	20
4.13 Display batch number	21
4.14 Display total batch number	21
5 LOGGING	22
5.1 Setting date and time	22
5.2 Log printer MELAprint®42 as output medium	24
5.2.1 Connecting the log printer MELAprint®42	24
5.2.2 Initialising the log printer MELAprint®42	24
5.3 Test output	25

5.4	Computer as output medium	26
5.5	Employing other devices as output medium	26
5.6	No output medium	26
5.7	Output of the logs	26
5.7.1	Automatic immediate log output	26
5.7.2	Output selected logs subsequently	27
5.7.3	Display protocol memory	28
5.7.4	Output all stored logs	29
5.7.5	Delete all stored logs	30
5.8	Read log files correctly	32
6	OPERATING PAUSES	32
6.1	Sterilization frequency	33
6.2	Shut-down/Transport	33
7	MAINTENANCE	33
7.1	Cleaning	33
7.2	Preparation of instruments	33
7.3	Rust formation = Drag-in rust	34
7.4	Use qualitatively high-grade feed water	34
7.5	Avoid formation of spots	35
7.6	Renewed Qualification	35
7.7	Maintenance recommendations	35
8	FUNCTION TEST	36
8.1	Water quality (conductivity)	36
8.2	Helix test body system MELAcontrol®/PRO	36
8.3	Continuous monitoring of sterilization process	36
9	OPERATIONAL ERRORS/MALFUNCTIONS	37
9.1	Warning messages	37
9.2	Malfunction messages	39
9.3	Reaction to warnings/error messages	42
9.4	No display on the screen	43
9.5	Emergency measure if the electric door release button fails	43
9.6	Too large feed water consumption	44
9.7	Bad drying results	44
9.7	Program modifications	44
10	IMPORTANT INFORMATION REGARDING ROUTINE OPERATION	45
11	APPENDIX	46
11.1	Technical Data	46
11.2	Additional technical data	47
11.3	Nominal value tolerances	49
11.4	Instructions for drying	49
11.4.1	Drying in sterilization containers	49
11.4.2	Textiles	50
11.4.3	Instruments	51
11.4.4	Loading the autoclave	51
11.4.5	Loading containers with soft sterilization packing material	52
11.4.6	Stacking sterilization containers	52
11.4.7	Removing the sterilized items	52
11.4.8	Improving the drying	52

1 Safety instructions

- When opening the door, particularly after interrupting the drying process, residual steam can escape from the autoclave chamber.
- After opening the door, do not touch any metal surfaces - these will be hot! Danger of burns. Always use the tray lifter to remove trays, or wear suitable hand protectors when taking out other items.
- Do not sterilize any liquids with this autoclave. It is not licensed for the sterilization of fluids. Failure to observe this can result in a delay in boiling, which could result in damage to the autoclave, burns and other injuries e.g. through splintered glass.
- Do not sterilize any liquids with this autoclave. It is not approved for the sterilization of liquids. Failure to observe, these instructions may lead to delayed boiling, damage to the autoclave and burns.
- The autoclave is intended for use outside the patient environment. The minimum distance to the treatment area must have a radius at least 1.5 meters.
- Under current VDE regulations, this autoclave is not suited for use in areas where there are risks of explosion.
- In order to ensure effective sterilization with the autoclave observe the instructions in this User Manual, and in particular ensure that the loading of the autoclave is appropriate for the program selected.
- The autoclave must only be serviced and repaired by MELAG or by its authorised representatives (specialist dealers or customer services) using only original parts and following service instructions.
- Documentation media (computer, CF card reader etc.) must be placed in such a way that they cannot come into contact with liquids.
- Before opening the housing always disconnect from the mains power supply!
- If you intend to install a water treatment unit from another manufacturer, then consult MELAG before you do so.
- We recommend the installation of a water leak detector.

1.1 Symbols on the autoclave

Symbol	Explanation
	Manufacturer of the medical device
	Date of manufacture of the medical device
	Serial number of the medical device by the manufacturer
	Article number of the medical device
	Indication of the scale of the chamber volume
	Operating temperature of the device
	Operating pressure of the device
	This User Manual contains important safety information. Failure to comply of the safety instructions could result in human and material damage.
	Please read this user manual carefully before commissioning the device. The manual includes important safety information. The functionality and value-retention of this sterilizer depends on the care accorded to it. Please store this user manual carefully and in close proximity to your sterilizer. It represents a component of the product.
	The symbol of the crossed out waste bin identifies a device that must not be disposed in domestic waste. The vendor is responsible for appropriate disposal of the device - it must be delivered to the vendor to be disposed of. By the designation of an apparatus with this symbol, the manufacturer furthermore declares that he satisfies all requirements of the law concerning the release, redemption and environmentally sound disposal of electric and electronic appliances. MELAG devices are synonymous for long-term quality. When you eventually need to decommission your MELAG device, we offer a special disposal service. Simply contact your stockist.
	In affixing the CE mark, the manufacturer declares that this medical product fulfils the basic requirements of the medical products directive. The four-digit number confirms that this is monitored by an approved certification agency.
	In affixing this CE mark, the manufacturer declares that this medical product fulfils the basic requirements of the pressure device directive. The four-digit number confirms that this is monitored by an approved certification agency.
	Indicates that operation of the autoclave should follow according to the safety instructions in the User manual

2 Description of the unit

2.1 Views of the unit

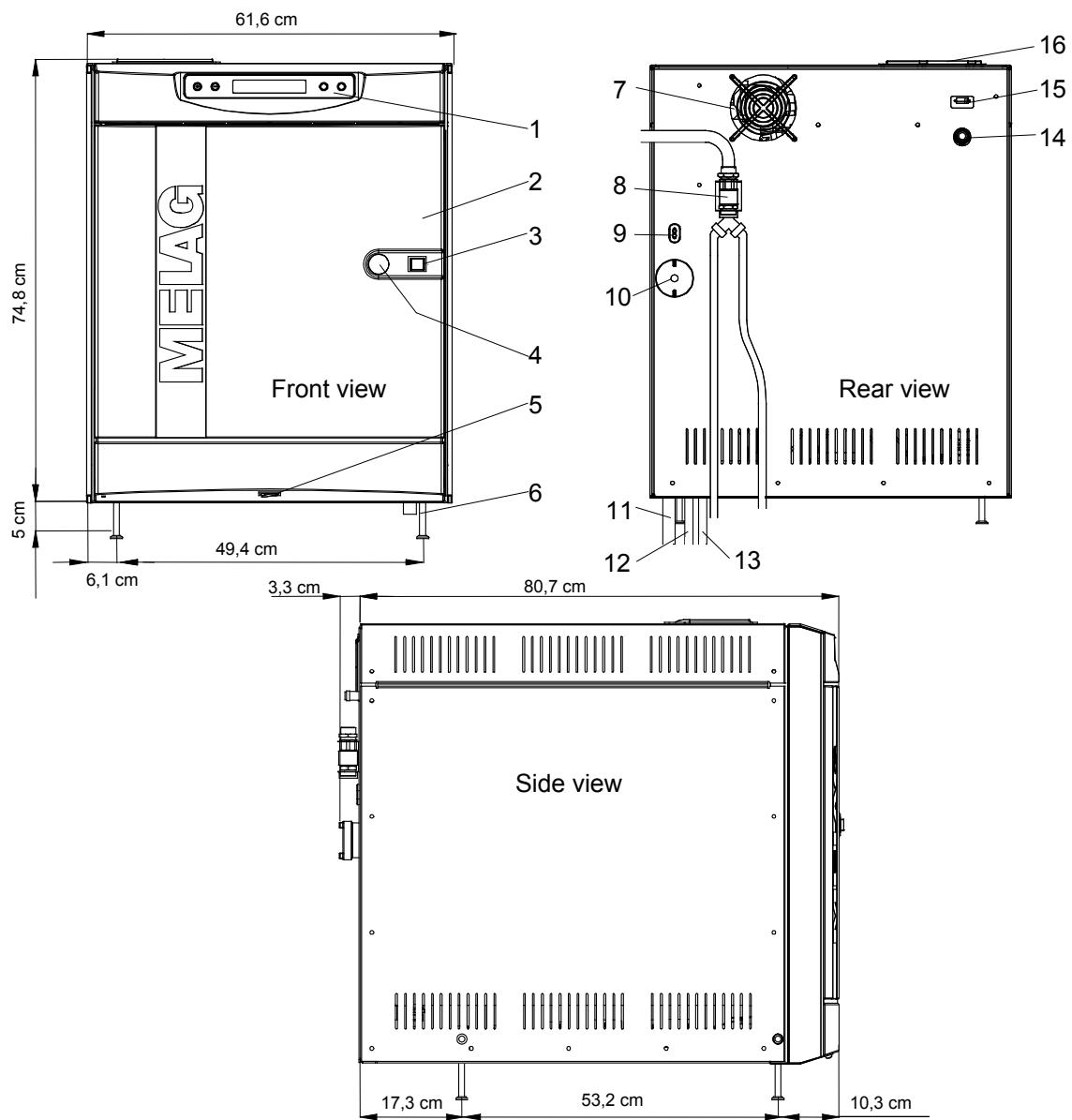
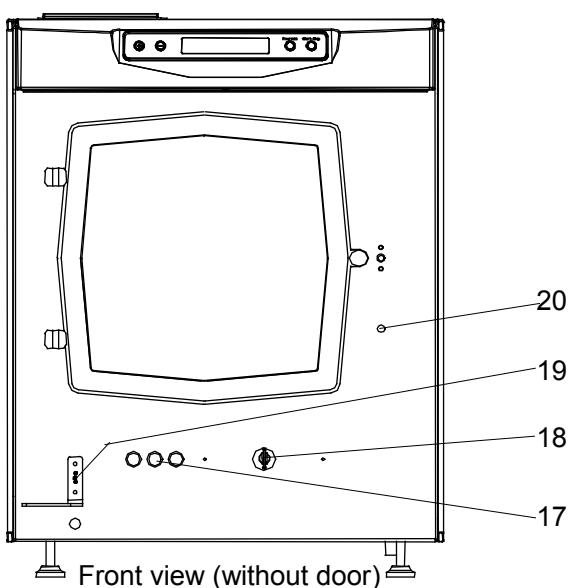


Fig. 1: Views of the Cliniklav®25

1 Control panel	9 Emergency pressure release and cavitation outlet
2 Door, opens to the left	10 Sterile filter
3 Door opener	11 Feed water inlet
4 Emergency door opening	12 Cooling water outlet (3/4" external thread)
5 Mains switch	13 Cooling water inlet (3/4" external thread)
6 Adjustable feet (when delivered without a lower cabinet)	14 Safety valve
7 Fan	15 Serial Interface (RS 232)
8 Safety combination according to EN1717	16 Log-Printer



17 Fuse 3x20 A
18 Protective motor switch
19 Reset for steam generator
20 Door contact switch

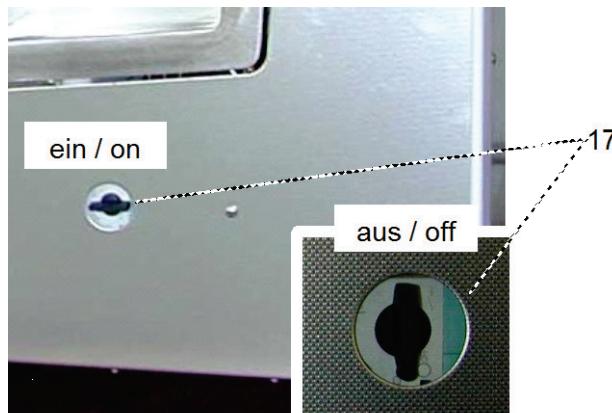


Fig. 1: Front view Cliniklav®25

Fig. 2: Front view of the Cliniklav®25

2.2 Control panel

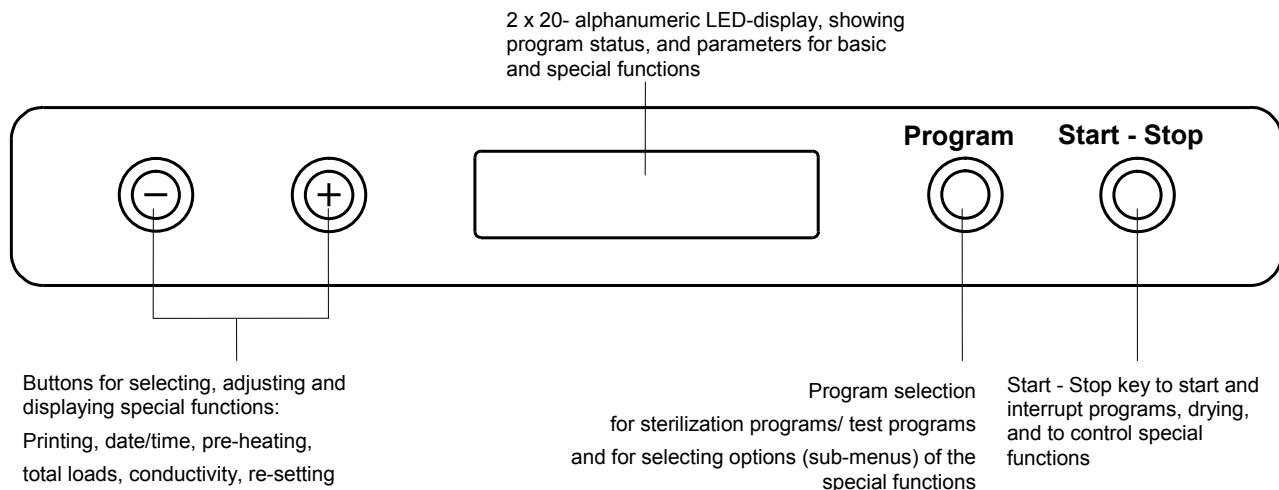


Fig. 3: Control panel of the Cliniklav®25

Technical Data

Chamber space (diameter x depth)	: 32 cm x 32 cm x 65 cm
Electric power supply	: 9000 W/400 V 3N AC/16 A/50/60 Hz
Sterilization pressure/temperature	: 2 bar/134°C; 1 bar/121°C
Maximum load	: 15 kg instruments or 7 kg textiles

For further technical data, please see the Appendix.

2.3 Performance features of this autoclave

2.3.1 Fractionating pulsed vacuum procedure

A fractionating pulsed vacuum method involved the repeated evacuation of the sterilization chamber, alternating with the introduction of steam in order to ensure the necessary penetration of the items undergoing sterilization with superheated steam.

This means that even demanding sterilization tasks, involving for example intricate instruments or large amounts of textiles can be completed quickly and reliably.

2.3.2 Programs for sterilization

The Cliniklav®25 features three sterilization programs for temperatures at 134°C: the “Universal Program” (for wrapped objects), the “Prion-Program” (a special Universal Program), the “Quick-Program” for unwrapped items, and the “Gentle-Program” (a sterilization program for textiles and rubber articles at 121°C). The user can at any time perform additional functional checks of the autoclave by running the Bowie & Dick test for steam penetration, and the Vacuum test for leak testing.

2.3.3 Separate steam generation

The generation of steam by a high-performance unit outside the sterilization chamber makes it possible to sterilize large loads of instruments or textiles quickly. It is not necessary to have any pauses between the sterilization runs, and overheating in the sterilization chamber is impossible.

2.3.4 One-way system/Conductivity measurement/Automatic water supply

The Cliniklav®25 operates with a reliable one-way system, in which all the condensate from a sterilization, including any impurities which this may contain is completely eliminated and purified water used for the next program run.

An integrated conductivity measurement system monitors the quality of the distilled or demineralized water used for the steam generation.

For frequent operations, the larger demand for purified water can be met by a water treatment unit, e.g. MELAdem® 55, which can be directly connected to the autoclave.

Provided the instruments to be sterilized are then also prepared carefully, stains on the load and soiling of the autoclave itself can be prevented.

2.3.5 Electronic Parameter Control (EPS)

The microprocessor in the Cliniklav®25 makes it possible to monitor pressure, temperature and time continuously during a program by Electronic Parameter Control. The overall operating time can then be optimised according the load and the temperature of the autoclave.

The process assessment and monitoring system in the program control compare current process parameters with standard process data and monitors the process relative to limit values for temperatures, times and pressures. This makes it possible to identify faults as they occur, and provides quality assurance for the sterilization processes.

2.3.6 Vacuum drying

Vacuum drying ensures the best possible drying results for packed utensils (see also 11.4).

2.3.7 Documentation

The electronic memory stores logs of the previous 40 programs.

For effective hard-copy documentation and for checking purposes, a MELAprint®42 printer can be connected to print out a log immediately after completion of a program or to print out logs from the memory. If the optional MELAtrace/MELAview documentation software is used with this autoclave, a Computer in the doctor's practice can be used to document the sterilization cycles, and to archive the required data. In this case, the data are transmitted from the autoclave via a serial interface to the Computer in the practice (the serial cable is delivered with the software).

3 Installation and Initial start-up

For preparing the installation and when you are setting-up and installing the autoclave, please consult the separate instructions leaflet "Installing the Cliniklav®25".

3.1 Power supply

Switch on the power using the switch on the front of the autoclave (bottom of the door housing cover in the middle). The autoclave is in the initial state:

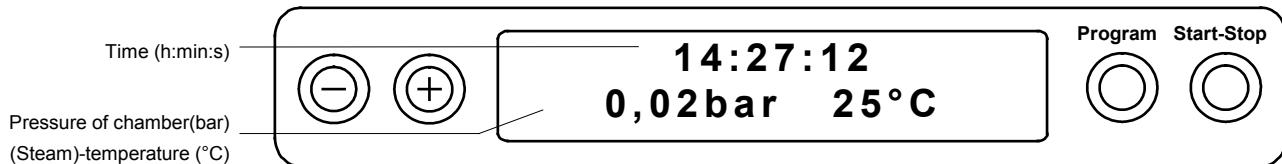


Fig. 4: View of the initial state of display

3.2 Connection of a water treatment unit

It is possible to connect a water treatment unit to the autoclave to directly supply it with distilled/demineralized water. Instead of connecting the autoclave to a water storage container, the feed pipe for distilled/demineralized water is directly hooked up to the water treatment unit.

For additional information on the application of the sterilization programs, please refer to section 7.4.

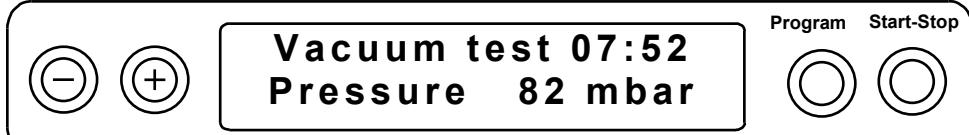
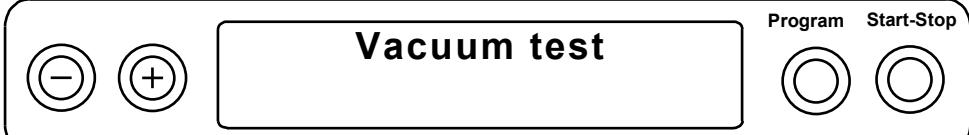
The MELAdem® 55 is ideal as choice for the water treatment unit: It has been designed to optimally meet the needs of the Cliniklav®25 with respect to water quality and output. The user manual for the MELAdem® 55 contains detailed instructions for installation and operation of this water treatment unit. If you decide, however, to use a water treatment unit made by another manufacturer, make especially sure that the system provides enough water in sufficient quality. We always recommend that you first coordinate with the MELAG company before buying another water treatment unit.

3.3 Vacuum test

In order to check the operation of the autoclave in the course of the initial start-up, after long periods without being used, or after moves, as well as periodically during routine use, a vacuum test should be carried out monthly to check for leaks.

The vacuum test should be carried out as follows, preferably on the cold autoclave:

Operation	Display message
1. Switch on at mains, then the display will show the basic parameters.	<p>14:27:12 0.02 bar 25°C</p>
2. Press the "Program" key several times until the display shows "Vacuum test" Close the door	<p>Vacuum test</p>
4. Press the key "Start - Stop"	<p>Vacuum test: Start Pressure 980mbar</p>
5. The evacuation pressure has been reached. The equilibration period begins	<p>Vacuum test 00:00 Pressure 80 mbar</p>

6.	After waiting for the equilibration (5 min) the measuring period starts (running here e.g. for 7 min 52s)	
7.	After the measuring period (10 min) the chamber is ventilated and ...	
	... then the leakage rate is displayed (if the option "Immediate output" is set to "YES" and a printer or another output medium is connected, a log will also be printed) The display shows "Last batch number" in alternation with "Quit with key '+'. By pressing the key '+' the door is unlocked and ...	 
	... the door can be opened after the message "Open door please" is displayed.	
8.	The display shows the selected program	

If the leakage rate is above the limit value (> 1.3 mbar/min), then the display (and the log) will also show "Test unsuccessful". In this case, follow the instruction in Section 9.1.

3.4 Bowie & Dick test

The Bowie & Dick test serves as proof of the steam penetration of porous materials such as textiles. Diverse test systems are offered by specialist dealers for the Bowie & Dick test. Perform the test according to the manufacturer's information to the appropriate test system. We recommend e.g. the Bowie & Dick test packet from 3M No. 1300.

Evaluation is performed following sterilization and removal of the linen test package from the autoclave.

How to start the Bowie & Dick test program:

1. Switch on the autoclave at the mains. The display switches into its initial state.
2. Select the "Bowie & Dick test" program by pressing the "Program" key repeatedly.
3. Press the "Start/Stop" key to start the program.

After a successful program run, the last batch number is displayed, alternating with the message "Quit with button '+'." You can open the door after pressing the '+' key.



NOTE

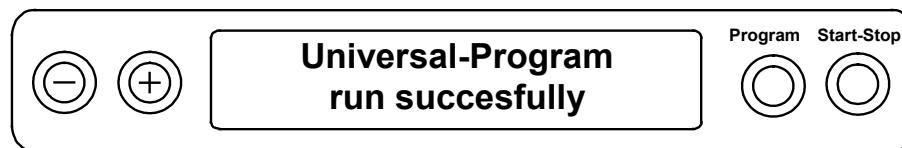
Treatment indicator strips often exhibit differing intensities in the colour change indicating a different length of storage of the manufacturer batches or other influences. Of crucial importance for evaluating the Bowie & Dick test is not the more or less strong contrast of the colour change, rather the even nature of the colour change on the test sheet.

If the treatment strips/treatment indicator sheet indicates an equal distribution of colour change, the ventilation of the sterilization chamber is without fault.

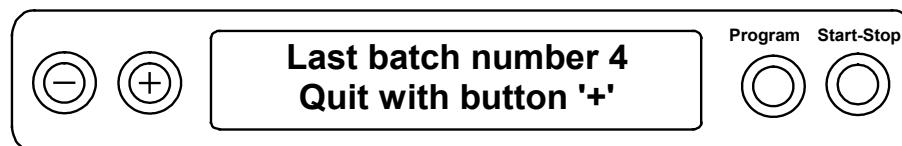
If the treatment indicator strips or the treatment indicator sheets are uncoloured or exhibit less colour in the centre of the star in comparison to the end, ventilation was insufficient. In such a case, please consult the stockist customer services/MELAG customer services.

3.5 Trial run

In order to check the operation of the autoclave under realistic conditions, a test run should be carried out with the "Universal-Program, 134°C wrapped" and a relevant load. After loading the autoclave and selecting the program with the "Program" key, the sterilization is started by pushing the "Start/Stop" key. If the program runs correctly, the following message will appear on the display (see section 4.9).



in alternation with:



If the option "Immediate output YES" has been selected for a log printer or another output medium, a log of the program run will be printed.

3.6 Record of installation and setting up

As documentation that the autoclave has been set-up properly, a record of installation and setting up should be produced by an authorised person and a copy sent to MELAG. This is important in the event that you wish to make claims under warranty provisions.

3.7 Validation

In accordance with EN 17665, the sterilization process should be validated before beginning routine operation with the autoclave.

4 Sterilization

4.1 Supply with fresh purified feed water/cooling water

The autoclave automatically monitors the availability of cooling water and purified water, as well as the quality of the distilled/demineralized water before starting a program.

In order to allow an immediate program start and to avoid malfunction messages or interruptions of programs (see Sections: 9.1 and 9.2):

- Before the first sterilization at the start of the working day, check that the water supply is turned on (water tap),
- If purified feed water is drawn from a storage container, check the water level, and if necessary fill up with purified water of appropriate quality (see section 7.4),
- If the feed water is drawn directly from a MELAdem® 55 water treatment unit, check that its water supply is turned on in good time (this may be up to an hour before starting a sterilization program), if the water supply has been turned off over night, for example.
- For routine operation, please refer to the information contained in section 10.

4.2 Preparation of instruments

MELAG non-rusting materials

All parts of the Cliniklav®25 which come into contact with steam are made of non-rusting material. The autoclave chamber and the steam conducting parts are made of stainless steel, the door is made of anodised aluminium and the threaded fittings and solenoid valves are made of brass.

Drag-in rust

The use of non-rusting materials excludes the formation of rust as a result of the components of the autoclave. Where rust forms on the autoclave or the items to be sterilized, investigations have repeatedly shown that this rust has been brought in from other sources. It should be borne in mind that rust can form even on best quality stainless steel instruments, for example as a result of improper treatment with chemical cleaning agents or disinfectant during preparation for sterilization.

Preparations of items for sterilization

The example of drag-in rust shows how important it is to prepare items properly for sterilization, and particularly the following points.:.

Handpieces and angles should be cleaned before the sterilization in accordance with the manufacturers instructions and maintained (e.g. oiled). The remaining instruments should be disinfected and cleaned immediately after use in accordance with UVV/VBG 103 with a disinfectant and/or cleaning solution. The solutions should be used in the correct concentration and care should be taken to observe the immersion times precisely!

It is advisable to make use of appropriate cleaning aids such as ultrasonic cleaning units, cleaning and maintenance equipment for handpieces and contra-angles, or thermo-disinfecting systems.

Cleaning the instruments before sterilization is very important in order to avoid introducing contamination which can separate from the instruments under steam pressure during sterilization and block filters, jets and valves of the autoclave. In particular, locks, joints and hinges should be thoroughly cleaned with a brush. Cleaning and disinfecting agents should be washed off the instruments thoroughly in running water, again with a brush. Residues of cleaning and disinfectant chemicals must not find their way into the autoclave, since they can lead to corrosion! Swill finally with demineralized water and then dry the instruments.

Turbines and transfer instruments should be oiled in accordance with manufacturer's instructions in order to ensure a long life for these components.

Brand-new instruments

The cleaning procedures described above are also necessary for brand-new instruments, since these often carry very small amounts of oil, fat and soiling from the manufacturing process.

Note: The instructions of the instrument manufacturers concerning first-time sterilization and re-sterilization should be followed carefully.

4.3 Loading the autoclave

It is of crucial importance for effective sterilization and good drying that the autoclave is loaded properly. Be sure to observe the following basic instructions when loading the autoclave.

Loading variations

Article	MELAG Art.-No.
Mounting for up to 4 trays or 2 instrument baskets	02517
Tray	00250
Instrument basket	00260
Max. 3 mountings for each 6 standard tray cassettes	02518
Standard-tray cassette, perforated with filter sheet	00289

All mountings are also suitable for accommodating the MELAG sterilization containers Type 15K, M, G, Type 17R, K, M, G; Type 23R, M, G, Type 28M, G.

In this case, we recommend using the additionally available chamber floor overlay (MELAG Art.-No. 46890), designed to protect the sterilization chamber from scratching.

Mounting

Normally, the autoclave should be used in conjunction with a mounting, since this ensures that steam penetration and drying are as good as possible. In exceptional situations (e.g. when using sterilization containers from other manufacturers), and after consultation with your specialist dealer or with MELAG, the mounting can be removed and the container can be placed directly in the autoclave chamber.

Trays

Trays for objects which are to be sterilized must be perforated, in order to allow condensate to run away. MELAG trays are recommended. If you use dishes or trays without perforations, then the objects being sterilized will not dry properly.

Closed sterilization containers

Closed sterilization containers must be perforated on at least one side (preferably underneath) or must have valves, in order to ensure that steam can penetrate and condensate can run out. All MELAG sterilization containers meet these requirements with perforations on two sides and filter-cloth-inlays.

Sterilization containers which only have perforations on the top only allow limited drying.

If sterilization containers are stacked in the autoclave, it is important to ensure that the perforations are not blocked.

Transparent sterilization packaging

If you use transparent sterilization packaging, such as MELAfo®, then the items should if possible be stood vertically on the tray, or sterilized in foil holders (MELAG Art. no. 22420). They should never be laid flat one on top of the other.

If seals split open during sterilization it may be necessary to increase the length of the sealing impulse or to use a double-seal.

Standard tray-cassettes sealed in MELAfo® (250 mm wide) must be taped and clasped additionally to ensure that the side-seals do not split open.

Multiple wrapping

The pulsed vacuum method means it is possible to use multiple wrapping.

Maximum loads

Loads should not exceed 15 kg of instruments or 7 kg of textiles.

Mixed loads

If mixed loads of textiles and instruments are to be sterilized, then as far as possible the textiles should be above the instruments and direct contact with the instruments should be avoided.

Inclusion of textiles and instruments in the same sterilization container is not desirable.

Textiles should never come into direct contact with the walls of the chamber.

If different types of packaging are included in a load, then:

- Instruments and sterilization containers should be at the bottom
- Transparent and paper sterilization packaging should be at the top (but lower than textiles)

Suitability for sterilization

Relevant information provided by manufacturers of instruments and textiles about sterilization should be strictly observed.

4.4 Program selection

A program should be selected which is appropriate for the physical properties of the items being sterilized (and in particular their heat resistance) and the type of packaging (if any part of the load is wrapped, then either the "Universal-Program" or the "Gentle-Program" must be used).

By pressing the "Program" selection key it is possible to review the display of the following programs for selection:

Program name/Display message	Parameter/Application
Universal-Program 134°C wrapped	Universal-Program. at 134°C, 2 bar, and a sterilization time of 5.5 min Sterilization of all types of wrapped items, in particular instruments, or mixed loads (unwrapped/wrapped)
Quick-Program B 134°C	Quick-Program B at 134°C, 2 bar and a sterilization time of 5.5 min. Sterilization for unwrapped items, simple wrapped (5.5 kg) instruments or porous load (4 kg) for rapid re-use.
Quick-Program S 134°C unwrapped	Quick-Program S at 134°C, 2 bar and a sterilization time of 3.5 min Sterilization only of unwrapped instruments (no textiles) for rapid re-use (drying can be interrupted manually)
Gentle-Program 121°C wrapped	Gentle-Program at 121°C, 1 bar and a sterilization time of 20.5 min. Sterilization of all types of wrapped items, in particular large amounts of textiles or thermosensitive materials (plastic, rubber), or mixed loads (wrapped/unwrapped)
Prion-Program 134°C wrapped 20'	Prion-Program (a special Universal-Program) at 134°C, 2 bar, and with sterilization time extended to 20.5 min, for sterilization of wrapped items, especially instruments and/or mixed loads (i.e., packed and unpacked). This program is recommended for sterilization of instruments used in situations in which the danger of infection by pathologically modified proteins is suspected: for example, Creutzfeld-Jacob and BSE).
Bowie & Dick Test 134°C 2.2 bar 3.5'	Bowie&Dick Test at 134°C, 2 bar and a sterilization time of 3.5 min Used to check the operation of the autoclave (Steam penetration of special indicators)
Vacuum test	Vacuum test Used to check the autoclave for leaks, from a cold start
15:31:33 0.02 bar 22°C	Basic display (no program selected)

4.5 Pre-heating

Operate the Cliniklav®25 only after it has been pre-heated. This will reduce the condensation of water on the wall of the sterilization chamber: which shortens the cycle times and greatly improves drying. When you start the Quick-Program S with an empty sterilization chamber, the cold autoclave chamber will be pre-heated. DIN EN 285 (for steam sterilizers) recommends preheating before beginning the actual sterilization cycle.

4.6 Selecting extra drying

The standard drying times for the various programs provide adequate drying if the autoclave has been loaded correctly (see section 4.3). Nevertheless, with certain loads residual moisture may remain. By selecting the "Additional drying" function, the drying time can be extended by 50%:

Operation	Display message
At the start of the program, press the "+" key. The display shows a message confirming the extra drying, and then the program runs as described in section 4.9 but with 50 % longer drying time.	 The display shows a central message box with the text "Additional drying selected". To the left is a "+" key, and to the right are two circular buttons labeled "Program" and "Start-Stop".

4.7 Opening and closing the autoclave door

To close the autoclave door, lightly press it closed, then press the door opener to position 2 shown below. The door is properly closed when the door opener remains depressed until the motor sound in the door stops.

Position 1: OPEN

Position 2: CLOSE

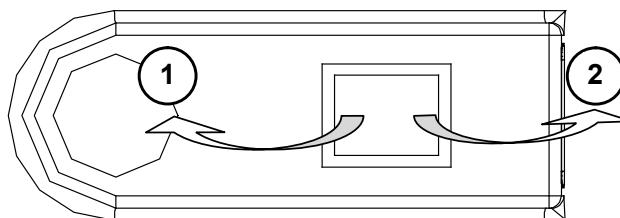


Fig. 5: Door opener

4.8 Program start

Press the "Start-Stop" key once the desired program is shown on the display. The availability of cooling water and feed water will be checked automatically, with a conductivity measurement.

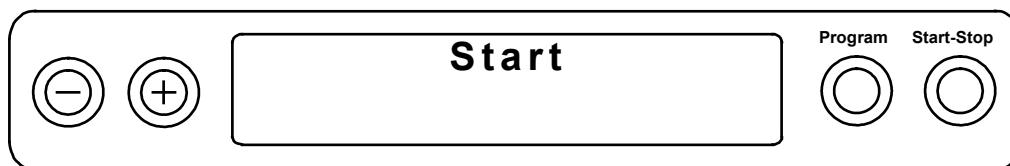
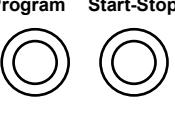
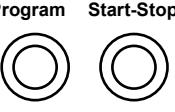
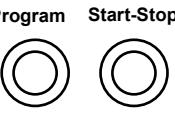
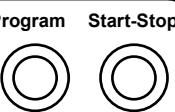
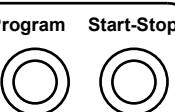
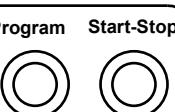
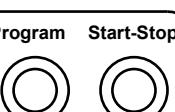
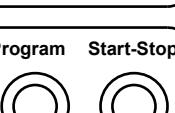
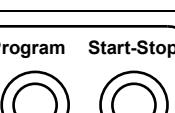


Fig. 6: Program start message

At the start of the Quick-Program S there will be an additional message "Warning! Only unwrapped instruments". This message must be acknowledged by pressing "Start" again.

4.9 Program progress

After starting the program, it will then progress automatically. The display shows the current program status as follows:

Program status	Display message	
1. Fractionation consisting of evacuation (removal of air) until the appropriate evacuation pressure is reached, followed by steam introduction up to slightly above atmospheric pressure. Display shows pressure in chamber and steam temperature	<p>1. Fractionation -0.085 bar 22°C</p>	
2. Phase 2 and following Depending on the program chosen and the temperature of the chamber at the start of the temperature, additional cycles may be necessary to ensure that air is evacuated and superheated steam enters the items being sterilized.	<p>2. Fractionation -0.85 bar 70°C</p>	
3. Heating phase A heating-up phase follows. The continuous introduction of steam raises pressure and temperature in chamber to the values needed for the program.	<p>Heat up 1.80 bar 117°C</p>	
4. Sterilization phase When the required pressure and temperature have been reached the sterilization proper then begins. The display shows alternately the pressure and temperature and the time remaining.	<p>Sterilization 2.18 bar 135°C</p> <p>Sterilization still 2 min, 12s</p>	 
5. Pressure release After completion of the sterilization time, the pressure is released and the steam generator emptied. Pressure and temperature fall.	<p>Press. release 0.85 bar 96°C</p>	
6. Drying phase After pressure release the drying phase begins. At this point it is possible to stop the program without this leading to a fault being reported, since the sterilization itself is now completed. However, with the exception of the "Quick-Program S", the drying phase should be allowed to run to completion.	<p>Vacuum drying sin. 1' -0.9 bar 99°C</p> <p>Immed. Removal press ,STOP'</p>	 
7. Ventilation After the drying, the chamber is ventilated, with pressure equilibration.	<p>Ventilation -0.12 bar 60°C</p>	

<p>8. Program end After ventilation of the chamber the program is completed. If a printer or another output medium is attached and option "Immediate output" is set to "YES", the log will be printed-out immediately.</p> <p>After pressing the '+' key the door is unlocked and ...</p>	<p>Universal-Program run successfully</p> <p>Last batch number 3 Quit with button '+'</p> <p>Program Start-Stop</p>
<p>9. Open the door ... can be opened after the display message "Please open door" is displayed.</p>	<p>Open door please</p> <p>Program Start-Stop</p>

4.10 Manual termination of program

4.10.1 Terminate before beginning of drying

A program can be terminated at any time by pressing the "Start-Stop" key. If the program has not yet reached the drying phase then the items will be **non-sterile** (or for some programs **non-disinfected**)!



Warning

The standard DIN EN 285 prescribes very good drying (residual dampness < 1% for textiles/ 0.2 % for metals), which cannot be guaranteed upon program abort (see above). In such a case, the requirements placed on sterilization by DIN EN 285 are not met.

When using "Quick-Program S", you can perform an early drying abort, effecting immediate renewed availability. The unwrapped instruments are to be removed following program end and left to dry through their own heat during cooling.



Warning

Depending on the previous operation of the autoclave steam may be released, when the door of the autoclave is opened. Steam may escape when the autoclave door is opened.

If the sterilization phase of the program had not been completed, then it is advisable to carry out an empty sterilization run before re-using the autoclave.

Operation	Display message
<p>1. Press the "Start-Stop" key To confirm, press the "Start-Stop" once again within 5 seconds. If no confirmation is given then the program resumes normally.</p>	<p>Stop Program? Press ,Stop'</p> <p>Program Start-Stop</p>
<p>2. If confirmation is given then the program stops. The pressure inside the autoclave will then be equilibrated, either by pressure release, or by ventilation (if vacuum inside).</p>	<p>Program stopped</p> <p>Pressure release 1.52 bar 112°C</p> <p>Program Start-Stop</p>

3. After pressure equilibration, the display will alternately show the messages "Program stopped" and an offer to quit the program termination.	 
4. To undo the program termination, press the " - " button. - Otherwise, the display for the selected program reappears.	

4.10.2 Terminate during drying

A program can also be terminated during the drying phase. Since in this case the sterilization has been completed, the items in this case can be treated as sterilized.

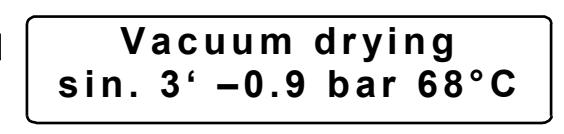
However, depending on the state at which the drying program is terminated, the load may not have dried sufficiently, and wrapped items in particular may not be dry enough for sterile storage. We therefore recommend that you do not interrupt the drying process for wrapped items in the "Universal-Program" and "Gentle-Program".

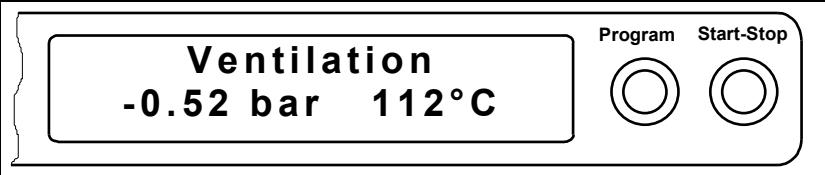
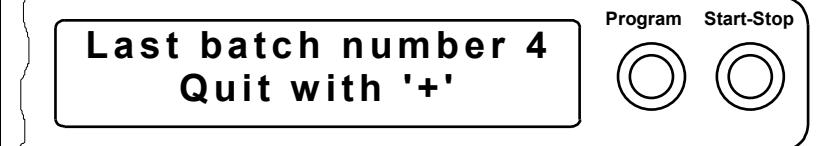
With the "Quick-Program S" it may be desirable to interrupt the drying program so that items can be used again. The unwrapped items will dry as they are cooling down.



If the drying process is interrupted than steam may be released when the door of the autoclave is opened.

Warning!

Operation	Display message
1. The autoclave is in the drying phase. The display shows the drying time alternately with the option to terminate the drying phase.	 
2. Press the "Start-Stop" key. To confirm, press the "Start-Stop" once again within 5 sec. If no confirmation is given then the program resumes normally.	
3. If the "Start-Stop" key has been pressed again to confirm then the program terminates.	

4. This is followed by ventilation of the autoclave chamber.	
<p>After the ventilation of the chamber the display shows that the program has been successfully completed ...</p> <p>... in alternation with "Last batch number 4 - Quit with '+'".</p> <p>If a printer or another output medium is connected and the option "Immediate output" is set to "YES" a log with confirmation that the drying process has been terminated is printed out.</p>	 
<p>By pressing the key '+' the door is unlocked ...</p> <p>... and can be opened after the message "Open door please" is displayed.</p>	 

4.11 Removing the sterilized items



Be careful when removing the sterilized items! **Touching the metal surfaces can lead to burns.** Always use the appropriate aids to lift the trays or wear suitable hand protection.

4.12 Sterile storage

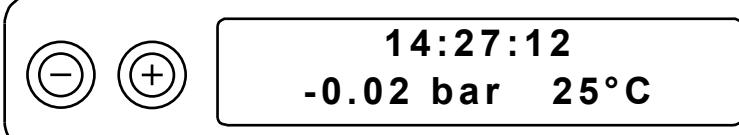
After removing wrapped sterile items, the wrapping should be checked for any signs of damage. If it is defective (e.g. split seals) then the sterilization of the items must be repeated after the items have been re-wrapped.

It is important for sterile storage that the items have been properly dried. The Cliniklav®25 provides very good drying if the program has not been interrupted before its completion and the autoclave has been properly loaded (see Section 4.3). Directly after sterilization there may still be residual condensation on the items or the container. Because the items are hot on removal, this will usually evaporate quickly. The German industrial standard DIN 58953 Part 7 Section 7 contains the following comment about residual moisture on paper wrapping or transparent sterilization paper after sterilization: "...small amounts of water on the wrapping are unproblematic, provided they have evaporated within 30 minutes after removal from the steam sterilizer....."

After cooling, wrapped sterilized objects should be stored in a place where they are **protected from dust** (e.g. instrument cupboard). Given proper storage, the sterilized objects can be stored up to 6 months according to DIN 58953-8:2003.

4.13 Display batch number

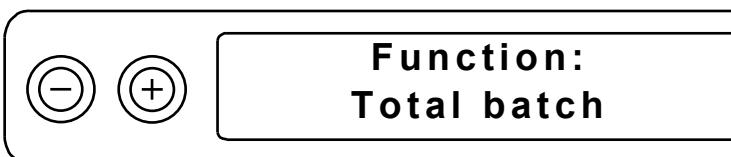
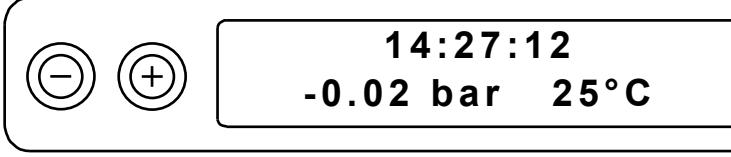
After every completed program you automatically see on the display the last batch number of the day. You can also allow the display of the last batch number whenever necessary:

Operation	Display message
1. Hold down "+" key and also press "-", Select "Function" menu, submenu "Last batch number".	
2. Press key "Program". The display shows the submenu "Last batch number".	
4. Close by pressing "Start-Stop", and return to the "Function" menu, then ...	
5. ... press "Start-Stop" again to return to the starting point	

4.14 Display total batch number

The Cliniklav®25 keeps a running count of the total number of batches sterilized, and this is displayed as follows:

Operation	Display message
1. Hold down "+" key and also press "-", Select "Function" menu, submenu "Last batch number".	
2. Press "+" until the display shows the submenu "Total batch".	
3. Press "Program", the display shows the current total batch number, e.g.:	

Operation	Display message
4. Close by pressing "Start-Stop", and return to the "Function" menu, then	
5. Press "Start-Stop" again to return to the starting point	

5 Logging

The European standard DIN EN 285 regulates the existence of an analogue or a digital register equipment for the batch documentation. In order to sterilize with the Cliniklav®25 in compliance with the standards it is necessary to connect a log printer, e. g. MELAprint®42., or a Computer , e.g. with the documentation software MELAtrace/MELAview.

In order to document the progress of the sterilization programs, then the processor memory stores logs of the last 40 programs.

These logs can be downloaded subsequently via the serial data and printer connection (RS232).

When the memory is full (40 program runs) then before the start of the next run the oldest log will automatically be overwritten. If an external printer or another output medium is connected (and operable) and the option "Immed. output? NO" has been selected, then confirmation will be requested before the oldest log is overwritten (see Section 9.1).

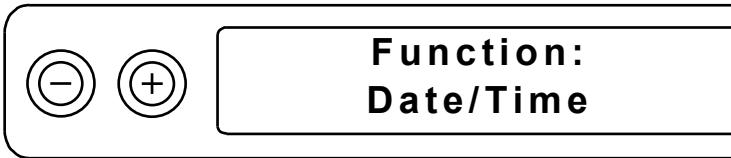
You can use the following listed devices for the batch documentation:

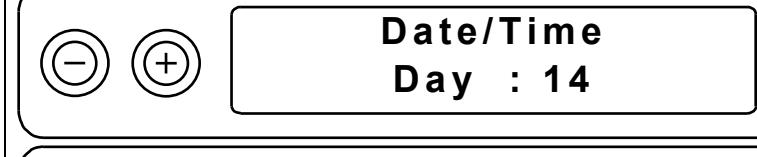
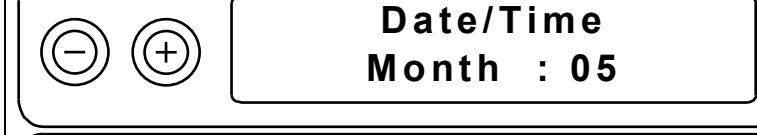
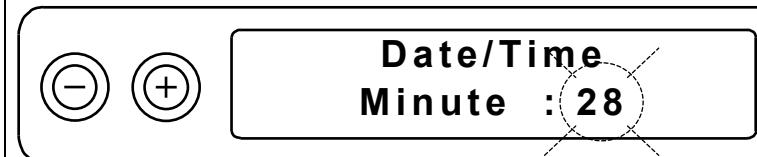
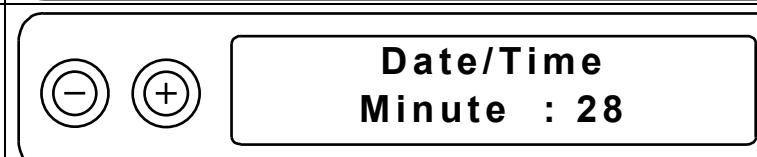
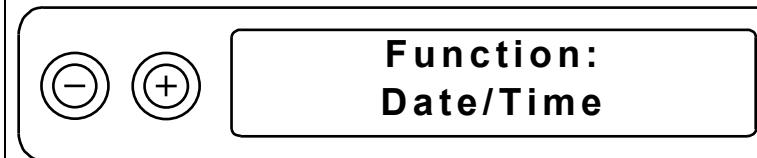
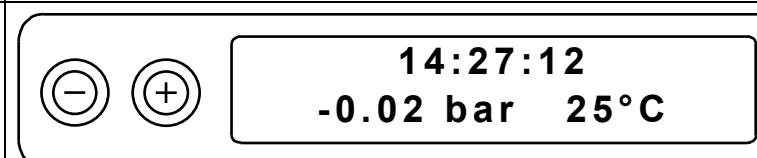
- Computer, e.g. with MELAtrace/MELAview
- Log printer MELAprint®42
- MELAflash CF-Card-Printer
- MELAnet Box
- Modem

Hardware details and the nature of the batch documentation are provided in the following sub sections.

5.1 Setting date and time

The date and time can be reset if necessary (e.g. winter time/summer time) as follows:

Operation	Display message
1. Hold down "+" button and also press "-" key. Select "Function" menu, submenu "Last batch number"	
2. Press "+" (or "-"), until the display shows the submenu "Date/Time".	
3. Press "Program", the display shows the current hour (24-hour clock) (here for example 17.00)	

Operation	Display message	
4. By pressing the "+" (or "-") key the following options can be selected:	    	
5. After finding the required option, e.g. "Minute", press the "Program" key and the current value flashes.		
6. Press "+" or "-" to increase or reduce the value:		
7. Press "Program" to confirm the new value, which then stops flashing. If more adjustment are necessary, return to point 4 and begin again ...		
8. ...or press "Start-Stop" to return to the "Function" menu and ...		
9. ... press "Start-Stop" again to return to the starting point.		

5.2 Log printer MELAprint®42 as output medium

If you have purchased a Cliniklav®25 with pre-installed log printer, and if you still cannot print out, then please continue below with Section 5.2.2.

5.2.1 Connecting the log printer MELAprint®42

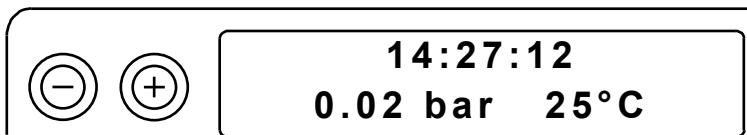
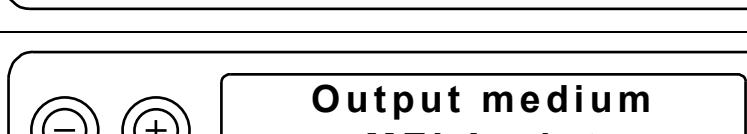
To connect a log printer (or another output medium) to the autoclave, you must hook up one end of the serial data- and printer cable to the 9-pin jack on the top of the autoclave (see section 2.1, Fig. 1, pos. 3), and the other end to the 25-pin connection jack on the rear of the printer. Securely insert the cable ends into the jacks, and screw down the threaded connections finger-tight.

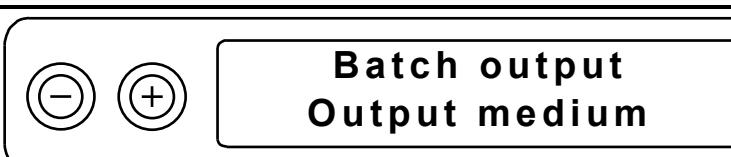
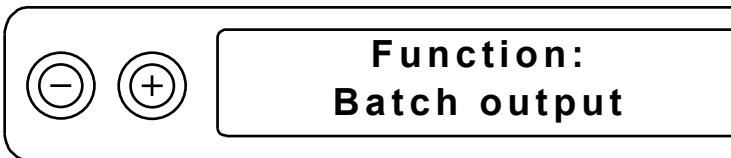
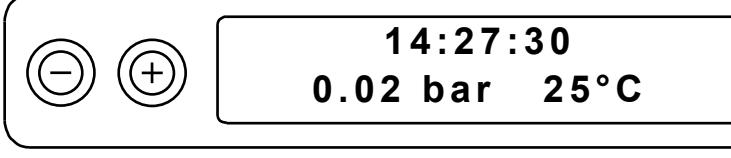
To provide power to the printer, plug the supplied power supply unit into the socket under the enclosure hood of the Cliniklav®25. Then insert the plug (low-voltage output of the power supply unit) into the power-supply jack on the rear of the printer.

For operation of the printer, please consult the instructions in its user manual.

5.2.2 Initialising the log printer MELAprint®42

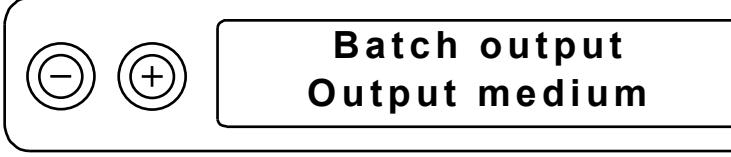
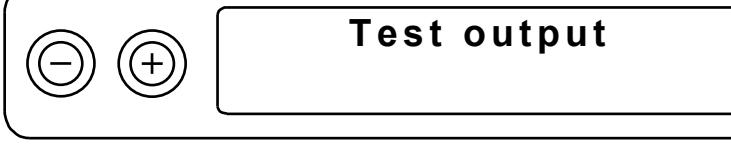
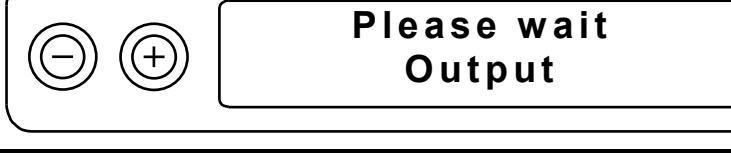
After connecting the printer to the autoclave it must be registered with the autoclave processing unit (initialised). Proceed as follows:

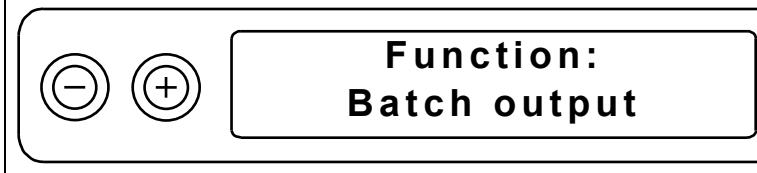
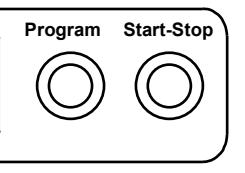
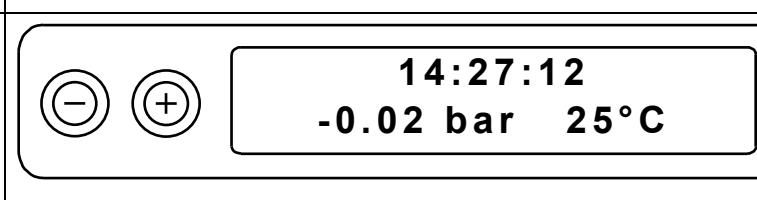
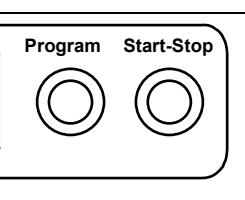
Operation	Display message
1. Switch on autoclave. Display shows time, pressure and temperature.	
2. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Last batch number".	
3. Navigate with key '+' (or '-') to the submenu "Batch output".	
4. Press "Program" key, select "Batch output", submenu "output medium".	
5. Press "Program" again, display shows current status e.g. "No output medium".	
6. Press "+" (or "-") key until display shows "MELAprint".	

7. Press "Program" key, confirm the setting, return to "Batch output" menu.	
8. Press "Start-Stop" key, return to the "Function" menu.	
9. Press "Start-Stop" key. Quit the "Function" menu and return to the initial display.	

5.3 Test output

In order to check the printer and its connection to the autoclave, a test log output can be made as follows:

Operation	Display message
1. Hold down "+" key and also press "-". Select "Function" menu, submenu "Print".	
2. Navigate with key '+' (or '-') to the submenu "Batch output".	
3. Press "Program" key, the display shows the menu "Batch output", submenu "output medium".	
4. Press "+" (or "-") until the display shows "Test output".	
5. Then press the "Program" key for a test output (or press "Start-Stop" to terminate)	

Operation	Display message	
6. Then press "Start-Stop" to return to the "Function" menu ...		
7. ... and press "Start-Stop" again to return to the starting display.		

5.4 Computer as output medium

Logs and archives can also be kept by using a Computer. This requires a suitable connection between the serial port of the Computer and the serial data and printer connection of the autoclave.

For data transfer and data processing then you can install the documentation software MELAtrace/MELAview on your Computer.

5.5 Employing other devices as output medium

For installation and operation of other output devices (e.g. MELAflash CF-Card-Printer, MELAnet Box) you find detailed information in the operating manual for the devices themselves.

In order to initialise the devices proceed as described in section 5.2.2, under step 6 select "MELAflash" or "MELAnet" as output medium.

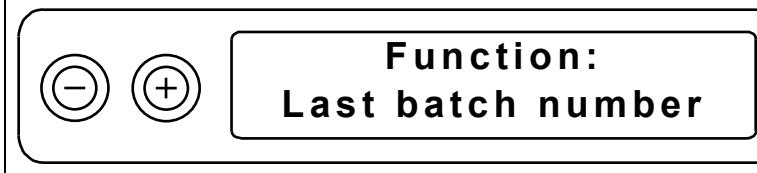
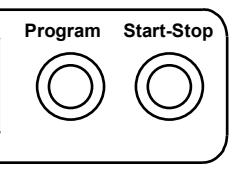
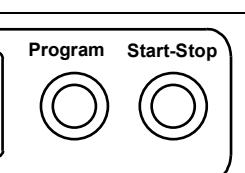
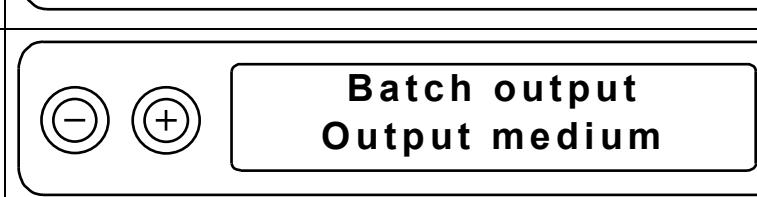
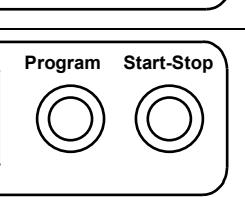
5.6 No output medium

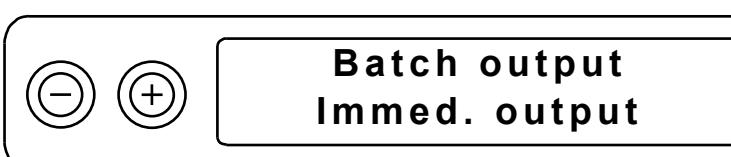
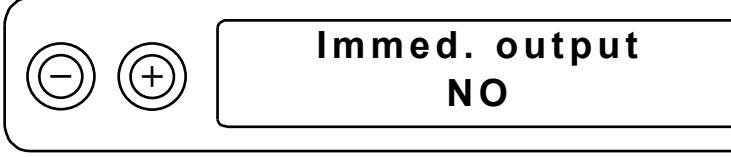
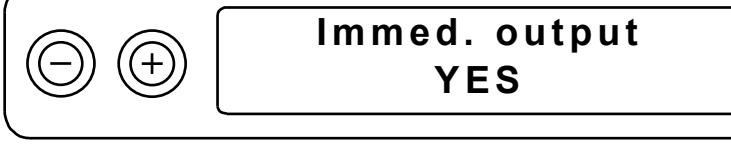
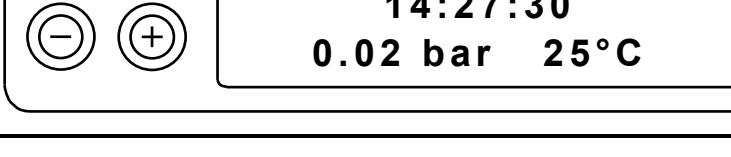
In order to select the option "No output medium" proceed as described as in section 5.2.2. Under point 6, however, use the "+" or "-" key to reach the setting "No output medium".

5.7 Output of the logs

5.7.1 Automatic immediate log output

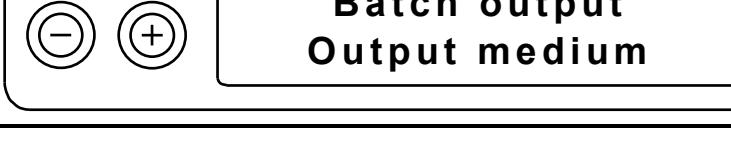
When a log printer or another output medium is fully installed, a log output can be produced automatically at the end of each program run by selecting the following options after switching on the autoclave:

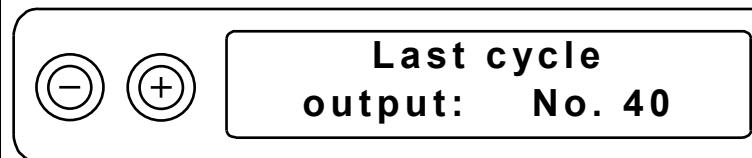
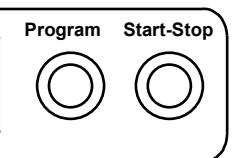
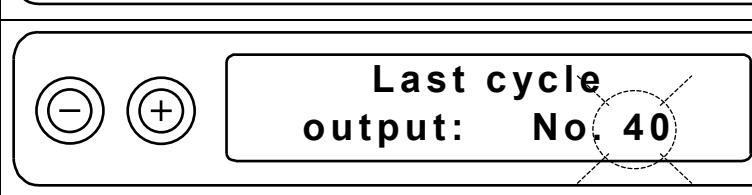
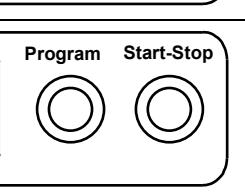
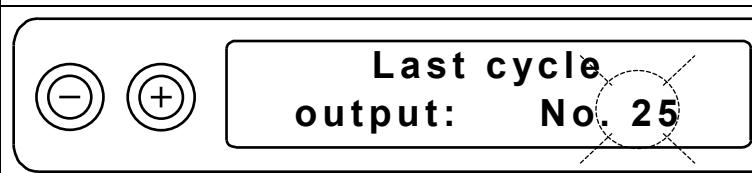
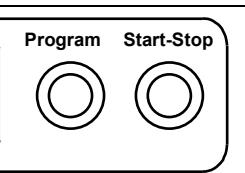
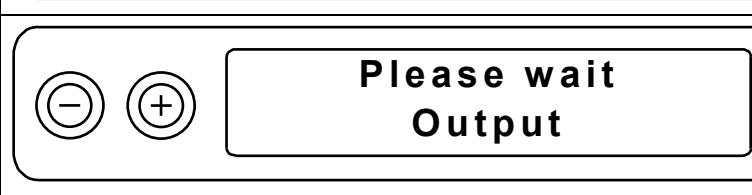
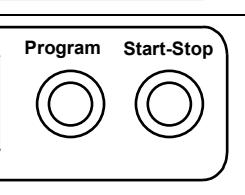
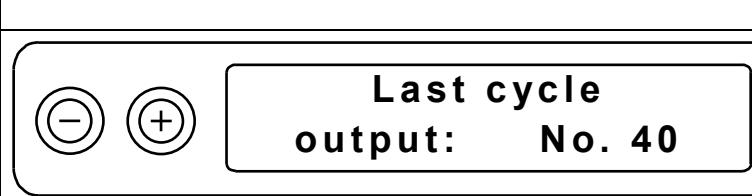
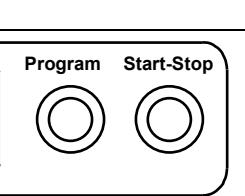
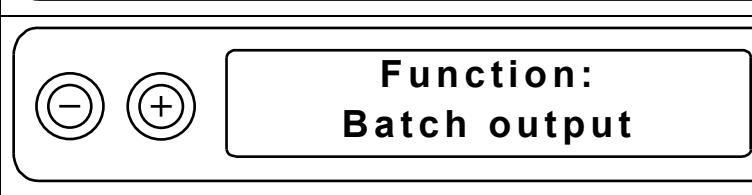
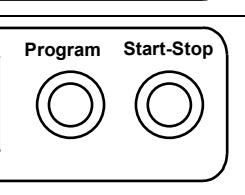
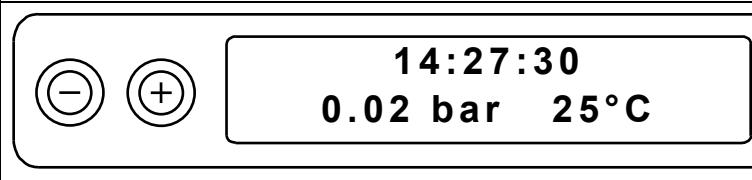
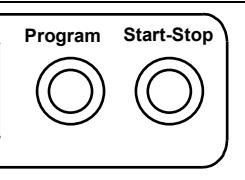
Operation	Display message	
1. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Last batch number".		
2. Navigate with key '+' (or '-') to the submenu "Batch output".		
3. Press "Program" key, select "Batch output" menu, submenu "Output medium".		

Operation	Display message
4. Navigate with key '+' (or '-') to the submenu "Immed. output".	
5. Press "Program", display shows current option, here e.g. "NO"	
6. The key "Program" can be used to switch between "YES" and "NO". Press "Program" key, select "YES" option.	
7. Press "Start-Stop" key, confirm the setting and return to "Function" menu, submenu "Batch output".	
8. Press "Start-Stop" key, quit the "Function" menu and return to the initial display.	

5.7.2 Output selected logs subsequently

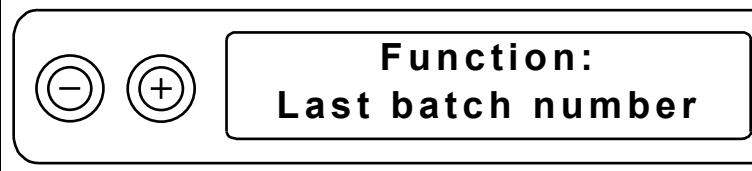
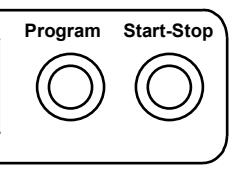
In order to output a log subsequently and independently from the time of the end of a program (an output medium is connected and initialised) proceed as follows:

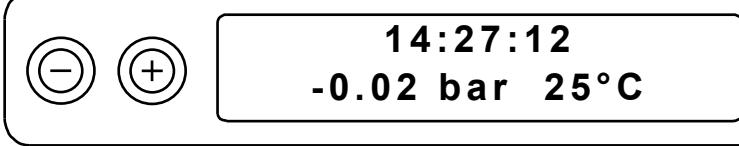
Operation	Display message
1. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Print".	
2. Navigate with key '+' (or '-') to the submenu "Batch output".	
3. Press "Program" key, select "Batch output" menu, submenu "Output medium".	

Operation	Display message	
4. Press "+" (or "-") until the submenu "Output last cycle" appears on the display.		
5. Press "Program" key, the cycle log number flashes.		
6. To select another number, press the "-" or "+" key until the right number is reached, e.g. here No. 25.		
7. Press "Program" key to start the output of the selected cycle, (or to terminate press "Start-Stop" and return to the "Function" menu).		
8. If you wish to output further cycles then return to point 4. or...		
9. ... to terminate press "Start-Stop" and return to the "Function" menu.		
10. Press the "Start-Stop" key to return to the initial display.		

5.7.3 Display protocol memory

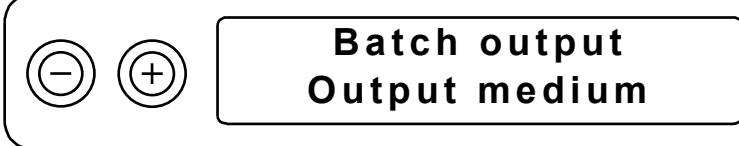
With a connected and initialised printer (or another output medium), the status of the protocol memory can be displayed as follows:

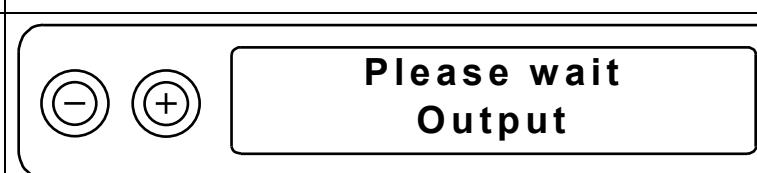
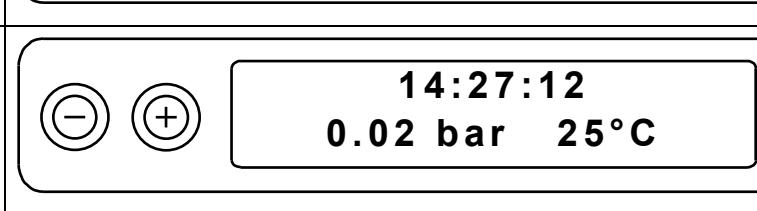
Operation	Display message	
1. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Last batch number".		

Operation	Display message
1. Navigate with key '+' (or '-') to the submenu "Batch output".	
2. Press "Program" key, select "Batch output" menu, submenu "Output medium"	
3. Press "+" (or "-") key until the display shows the memory status, e.g.:	
4. Press the "Start-Stop" to return to the "Function" menu ...	
5. ... and press "Start-Stop" again to return to the starting display.	

5.7.4 Output all stored logs

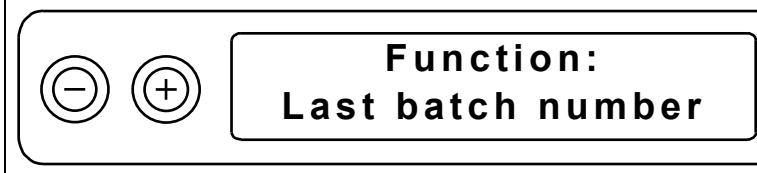
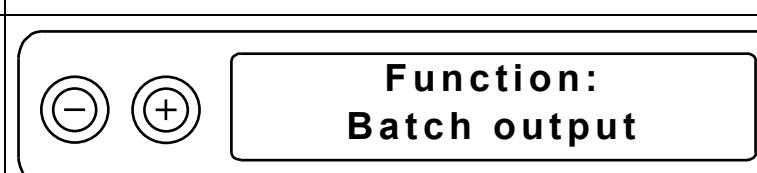
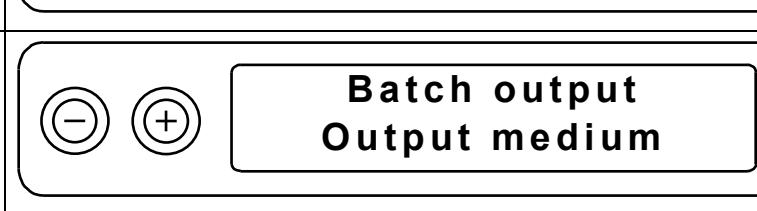
In order to output all stored cycle logs (with a connected and initialised printer or another output medium) then select the following options after switching on the autoclave:

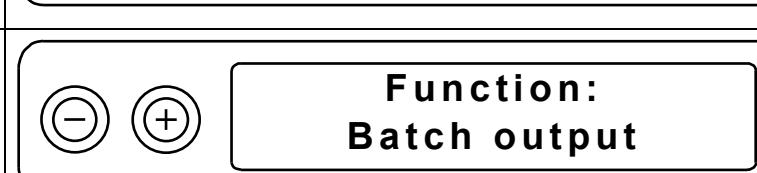
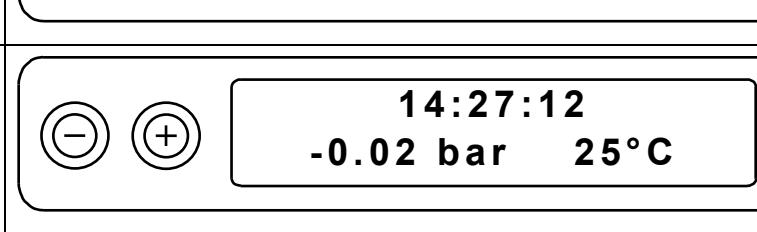
Operation	Display message
1. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Print".	
2. Navigate with key '+' (or '-') to the submenu "Batch output".	
2. Press "Program" key, select "Batch output" menu, submenu "Output medium".	

Operation	Display message	
3. Press "+" (or "-") until the submenu "Output stored cycles" appears on the display.		
4. Press "Program" key to start the output of all the stored logs (up to 40!), or to terminate press "Start-Stop" and return to the "Function" menu (Once printing has started termination is only possible by switching off the power!)		
5. When the output is complete, the display again shows the submenu :		
6. Press the "Start-Stop" key to return to the "Function" menu ...		
7. ... and then press "Start-Stop" again to return to the initial display.		

5.7.5 Delete all stored logs

In order to delete all stored logs (e.g. in the event of the warning message "Protocol memory full", with the option "Immed. output? NO", selected (see section 5.7.1), then after switching on the autoclave proceed as follows:

Operation	Display message	
1. Hold down "+" key and also press "-" key. Select "Function" menu, submenu "Print".		
Navigate with key '+' (or "-") to the submenu "Batch output".		
2. Press "Program" key, select "Batch output" menu, submenu "Output medium" and press key "Program".		

Operation	Display message	
3. Press "+" (or "-") until the display shows "Delete all cycles".		
4. Press the "Program" key to delete all stored logs (or press "Start-Stop" to terminate).		
5. Then press "Start-Stop" to return to "Function" menu ...		
6. ... and press "Start-Stop" again to return to the starting display.		

5.8 Read log files correctly

The log file contains the following information:

----- MELAG Cliniklav 25 -----						
Program	Program	Universal-Program	Program			
Date	Date	134°C wrapped	Date			
Time	Time of start	08:35:50 (Start)	Time of start			
Batch No.	Batch number of the day	2	Batch number of the day			

AIN6: Conductivity	10 µS/cm	Conductivity of purified feed water	Conductivity of purified feed water			
Program step	Press.	Temp.	Time			
	bar	°C	min			
Start	0.01	53.4	00:00			
1.Fractionation						
Evacuation	-0.92	49.6	01:39			
Steam entry	0.40	108.8	06:36			
2.Fractionation						
Evacuation	-0.84	58.1	09:54			
Steam entry	0.41	109.8	14:05			
3.Fractionation						
Evacuation	-0.84	57.9	17:47			
Steam entry	0.40	109.8	21:48			
4.Fractionation						
Evacuation	-0.84	65.9	25:22			
Steam entry	0.41	109.8	29:27			
Heat up	2.04	134.4	33:45			
Steriliz. begin	2.04	134.4	33:45			
Steriliz. end	2.15	135.9	39:15			
Press. release	0.19	108.7	40:06			
Vacuum-Drying						
Drying begin	-0.30	99.8	40:31			
Drying pressure	-0.88	80.9	43:21			
Drying pressure	-0.91	64.7	46:41			
Drying pressure	-0.92	55.8	50:01			
Drying pressure	-0.93	50.5	53:21			
Drying pressure	-0.93	46.9	56:41			
Drying pressure	-0.94	44.3	60:01			
Drying end	-0.82	44.2	60:31			
Ventilate	-0.29	44.4	61:28			
End	-0.10	44.5	61:58			

PROGRAM PROPERLY EXECUTED!						
Temperature	: 136.1 +0.4 /-0.3 °C					
Pressure	: 2.17 +0.03/-0.03 bar					
Sterilization time:	5 min 30 s					
Time	: 09:37:49 (End)					

23 200701063 4.07 4.07						
Info-line with total number of batches, Works number and software version.						

6 Operating pauses

In general, the door should only be leant to during operational pauses in order to reduce wear on the door seal and to avoid premature failure or sticking.

In the event of longer breaks, such as during vacations, the cooling water supply should be turned off (and the feed water supply from the water treatment unit if one is connected). We recommend that you do not disconnect the power supply.

If you allow the autoclave to remain unused for a lengthy period of time, we recommend to perform a sterilization cycle with an empty sterilization chamber, before normal use again.

6.1 Sterilization frequency

After completing or terminating the drying phase, the autoclave can be reloaded and started immediately. No pauses in operation are necessary.

6.2 Shut-down/Transport

When closing down and transporting the autoclave you should proceed as follows:

- Switch off the power.
- Disconnect from the mains; allow the autoclave to cool down.
- Turn off cooling water and feed water supplies.
- Disconnect pipes at rear of autoclave.
- If transporting the autoclave with trays and mounting in place, then protect the inside surface of the door by including a sheet of foam or similar material.
- When setting the autoclave up for re-use after transport or repairs then proceed in accordance with section 3.

7 Maintenance

7.1 Cleaning

The tray assembly and the autoclave chamber including the contact area of the door gasket and the door opening should be inspected thoroughly at least once a week for signs of damage or soiling. If necessary, wipe out the autoclave chamber using a **lint-free cloth** and surgical spirits. This involves withdrawing the trays and mounting. Stubborn spots can be removed using small amounts of a mild commercial steel cleaning agent (pH-levels from 5 to 8). Care must be taken to ensure that cleaning agent does not get into the pipes attached to the autoclave chamber. The cleaning agent must not contain chlorine and should not be alkaline. Do not use abrasive cleaning pads, steel wool, or brushes.

Inspect the door seal every week for signs of damage and soiling, and if necessary clean it with a mild commercial liquid cleaning agent (pH-levels from 5 to 8) or with surgical spirits. If necessary, the seal can be removed.

The bolt of the door lock (right side) and the door hinge (left side) must be regularly lubricated with silicone grease, in order to ensure that the door can easily be locked and unlocked, without unnecessary wear.

The outer parts of the autoclave can be cleaned with a mild commercial cleaning agent or with surgical spirits.

If the feed water is not provided directly but is stored in a container then this should be inspected every time it is refilled to make sure it is clean. If necessary it should be cleaned before refilling. If you have a MELAG storage container then please note the instruction on the label.

7.2 Preparation of instruments

MELAG non-rusting materials

All parts of the Cliniklav®25 which come into contact with steam are made of non-rusting material. The autoclave chamber and the steam conducting parts are made of stainless steel, the door is made of anodised aluminium and the threaded fittings and solenoid valves are made of brass.

Drag-in rust

The use of non-rusting materials excludes the formation of rust as a result of the components of the autoclave. Where rust forms on the autoclave or the items to be sterilized, investigations have repeatedly shown that this rust has been brought in from other sources. It should be borne in mind that rust can form even on best quality stainless steel instruments, for example as a result of improper treatment with chemical cleaning agents or disinfectant during preparation for sterilization.

Preparations of items for sterilization

The example of drag-in rust shows how important it is to prepare items properly for sterilization, and particularly the following points:

hand pieces and angles should be cleaned before the sterilization in accordance with the manufacturers instructions and maintained (e.g. oiled). The remaining instruments should be disinfected and cleaned immediately after use in accordance with UVV/VBG 103 with a disinfectant and/or cleaning solution. The solutions should be used in the correct concentration and care should be taken to observe the immersion times precisely!

It is advisable to make use of appropriate cleaning aids such as ultrasonic cleaning units, cleaning and maintenance equipment for hand pieces and contra-angles, or thermo-disinfecting systems.

Cleaning the instruments before sterilization is very important in order to avoid introducing contamination which can separate from the instruments under steam pressure during sterilization and block filters, jets and valves of the autoclave. In particular, locks, joints and hinges should be thoroughly cleaned with a brush. Cleaning and disinfecting agents should be washed off the instruments thoroughly in running water, again with a brush. Residues of cleaning and disinfectant chemicals must not find their way into the autoclave, since they can lead to corrosion! Swill finally with demineralized water and then dry the instruments.

Turbines and transfer instruments should be oiled in accordance with manufacturer's instructions in order to ensure a long life for these components.

Brand-new instruments

The cleaning procedures described above are also necessary for brand-new instruments, since these often carry very small amounts of oil, fat and soiling from the manufacturing process.

Note: The instructions of the instrument manufacturers concerning first-time sterilization and re-sterilization should be followed carefully.

7.3 Rust formation = Drag-in rust

As already explained, the non-rusting materials used in the autoclave cannot cause rust formation in the autoclave!

Where rust forms this is "drag-in rust". This originates from instruments or other metal items carrying traces of rust, even though they are made of stainless steel, or which are made of normal steel but which have a damaged galvanic coating. Often, a single rusty instrument is enough to pass rust on to other instruments or to lead to film rust forming in the autoclave resulting to corrosion damage. Drag-in rust must be removed from the affected instruments or from the autoclave and mounting using a mild commercial cleaning agent for stainless steel. Do not use steel wool, a wire brush or other abrasive cleaners! Spots can be removed with a damp, lint-free cloth or a cloth with surgical spirits or alcohol.

7.4 Use qualitatively high-grade feed water

Quality requirements

For steam sterilization it is necessary to use high quality distilled or demineralized water.

The DIN EN 285:2009 recommends to notice the guide values for water quality in accordance with the appendix B, table B.1.

Guide values for water quality in accordance with the CEN standard DIN EN 285:2009, Appendix B

Table B.1 – impurities in the feed water for an assigned steam generator

Substance/properties	Feed water
Evaporation residue	≤ 10 mg/l
Silicates	≤ 1 mg/l
Iron	≤ 0.2 mg/l
Cadmium	≤ 0.005 mg/l
Lead	≤ 0.05 mg/l
Residues of heavy metals apart from iron, cadmium, lead	≤ 0.1 mg/l
Chloride	≤ 2 mg/l
Phosphate	≤ 0.5 mg/l
Conductivity (at 25 °C)	≤ 5 µS/cm *)
pH value	5 - 7
Appearance	without colour, without residue
Hardness	≤ 0.02 mmol/l

*) µ *) µS/cm = micro-Siemens per centimetre

Table B2 - Impurities in the condensate of a sterilizer steam supply, measured in the feed line.

Substance/properties	Condensate
Silicates	≤ 0.1 mg/l
Iron	≤ 0.1 mg/l
Cadmium	≤ 0.005 mg/l
Lead	≤ 0.05 mg/l
Heavy metals apart from iron, cadmium, lead	≤ 0.1 mg/l
Chloride	≤ 0.1 mg/l
Phosphate	≤ 0.1 mg/l
Conductivity	≤ 3 µS/cm *)
pH value	≤ 5 - 7
Appearance	without colour, no deposits
Hardness	0.02 mmol/l

The special construction of the steam generator and the procedure employed to generate the steam (integrated gas venting) makes higher conductivity values permissible.

As a result, the value of 5 recommended in accordance with DIN EN 285:2009 in table 1 can be exceeded. At 15 S/cm, the water treatment unit mixed-bed resin cartridge should be replaced. Once conductivity has reached 20 S/cm the display issues a warning message. At this point at the latest, the mixed-bed resin cartridge should be replaced/the unit should be checked.

7.5 Avoid formation of spots

Formation of spots on instruments

The extent to which spots form on instruments depends on the quality of the water used to produce the steam.

7.6 Renewed Qualification

DIN EN 17665 recommends a new qualification at regular intervals.

A new standard DIN 58946-7 is currently in preparation. This will make concrete proposals for the initial validation, the renewed qualification as well as daily routine operation.

7.7 Maintenance recommendations

Regular maintenance of the autoclave is important if it is to have a long life and remain in good working order. MELAG recommends that the Cliniklav®25 be serviced annually by a trained technician in accordance with maintenance instructions for this autoclave. The annual service includes a visual inspection and a test of operational functions. As well as all essential components and electrical elements, parts are also inspected for wear and replaced as necessary.

A maintenance reminder appears on the display every two years or after 1000 sterilizations.

Consult your dealer of the MELAG Customer service if you have any questions relating to servicing and maintenance.

Notice

National pressure vessel requirements may ask the user of pressure vessel, such as autoclaves, to carry out safety inspections. Please check the download area from our website and find our recommendation in accordance with German requirements. For more information ask your local authorities.

8 Function test

8.1 Water quality (conductivity)

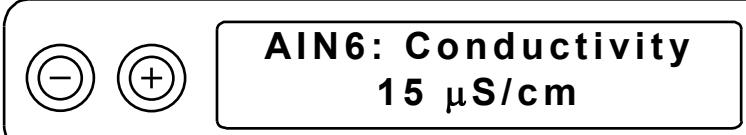
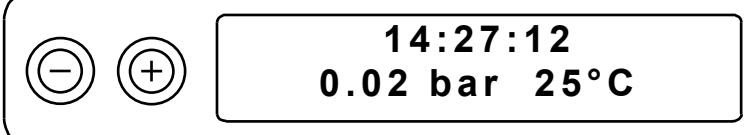
The conductivity should be checked every day before starting routine operation.



NOTE

If the autoclave is continued operating even if the warning message is issued as soon as the conductivity value has reached 20 µS/cm a Helix test body should be added to each sterilization cycle to check the steam for non-condensable gases (see next section). Once the conductivity has reached 35 µS/cm the display issues a malfunction message. A program start is then no longer possible.

By repeatedly pressing the "-" key then the preheating temperature of the chamber and the conductivity of the purified feed water used for steam generation can be displayed alternately.

Operation	Display message
<p>1. Press down the "-" key to display the conductivity of the feed water in µS/cm.</p> <p>Release the "-" key to return to the basic display (as shown here) or the program status</p>	 

8.2 Helix test body system MELAcontrol®/PRO

The test body system MELAcontrol®/MELAcontrol® PRO is an indicator and batch control system fulfilling the requirements of DIN EN 867-5. It consists of a test body, the Helix and an indicator strip. If sterilizing category "critical B" instruments, you should add the MELAcontrol®/PRO test body to every sterilization cycle as a batch control. Regardless of this, you can perform a steam penetration test at any time using MELAcontrol®/PRO in the Universal-Program. Specified use of the Helix test body can result in the colouration of the plastic surface. This colouration exercises no influence on the functionality of the Helix test body.

8.3 Continuous monitoring of sterilization process

The electronic parameter control means that all relevant parameters are constantly monitored and compared with standard process data, so that error reports can be made immediately. If a program is completed without problems then on its completion there is an "End" message. The log output contains a corresponding report.

The operator of the autoclave can check the progress of the program at any time by means of the values shown on the display (or after its completion by means of the log output).

9 Operational errors/Malfunctions

If the autoclave does not seem to be working properly (e.g. poor drying, warnings, or error reports) then follow these instructions in order to exclude possible operational errors.

Following these instructions continue to work with the autoclave. If the malfunction occurs repeatedly then contact your dealer, and authorised MELAG customer service or contact MELAG directly. You should describe the problem precisely and include the works number of your autoclave.

9.1 Warning messages

For the following warning messages, please observe the comments made and restart the program in question. If the warning occurs repeatedly please consult your specialist dealer.

Warning message	Cause/Remedy
WARNING! Door open No start possible Acknowledge with button '-'	<p>Door contact (see section 2.1, Fig. 2, pos. 19) is not closed when the autoclave is started:</p> <ul style="list-style-type: none"> • The door is not correctly closed. • Hold down the door opener until the message "Door closed" appears in the display (see section 4.7).
WARNING! No cooling water Check Tap water Acknowledge with button '-' Stop/ end 0.02 bar 35°C	<p>Cooling water switch has not opened:</p> <ul style="list-style-type: none"> • Check water inlet, open water tap • Check pressure of mains water supply pressure (if too low it may be necessary to install a pressure booster) • Check if the motor protection switch has tripped (Fig. 2, pos. 17) (no sound from vacuum pump). Press button of protection switch back down.
WARNING! No feed water Feed water Check supply No start possible Acknowledge with button '-'	<p>Float switch for the supply of distilled or demineralized water has not closed (when filling the steam generator):</p> <ul style="list-style-type: none"> • If you have a water storage container: <ul style="list-style-type: none"> • Check the water level in the container. If necessary refill with purified water. • Check that the intake tube is free from twists or kinks • Check that the height difference between autoclave and water level is not too great (max. 1.5 metres) • If you have a MELAdem® 55 water treatment unit: <ul style="list-style-type: none"> • Check the water treatment unit. If necessary open the water intake tap. If the pressure water storage unit is empty wait approximately 1 hour before restarting the program. If the message reappears repeatedly, have the water treatment unit serviced. <p>If the autoclave is being used for the first time or is being restarted after a break then this message may simply be caused by the fact that the tubes were initially empty - just repeat the start procedure.</p>

Warning message	Cause/Remedy
Feed water quality bad	<p>Conductivity of the demineralized or distilled water is above the first limit value of 20 µS/cm, a start is possible by pressing the "Start" key once more:</p> <ul style="list-style-type: none"> • If water is from a storage container, then empty the container, clean it thoroughly with distilled or demineralized water, and refill with water which meets the purity specifications. • If water is from a MELAdem® 55 water treatment unit: The demineralization cartridge in the reverse osmosis unit may be exhausted. Exchange in accordance with the operating manual. • Water from other water treatment units: Exchange the demineralization/deionisation unit in accordance with the manufacturer's instructions.
Feed water check quality	<p>After taking the appropriate steps, carry out the program start. When starting for the first time after exchanging the purified water container, or after maintenance of the water purification equipment, there may be another report because at first the supply tube and/or measuring cell will not have been washed out with fresh, pure water.</p>
 Feed water quality insufficient	<p>Conductivity of the demineralized or distilled water exceeds the second limit value of 35 µS/cm - a program start is no longer possible:</p> <ul style="list-style-type: none"> • Proceed as above for "Water quality bad".
No start possible Acknowledge with button '-'	
WARNING! Sterile filter Replace Acknowledge with button '-'	<p>The pressure for the ventilation drying lies outside the permitted range. The message comes at the end of the program, and as the last line of the log file:</p> <ul style="list-style-type: none"> • The sterile filter may be clogged or torn. Exchange the sterile filter (MELAG Art. No. 20160).
Output medium not ready	<p>Communication with the log printer via the serial data and printer connection or another output medium been interrupted. This message appears when a log cannot be printed out. It is displayed for 20 seconds. If the output medium becomes operational during this period the cycle log is printed out:</p> <ul style="list-style-type: none"> • The autoclave may be operated without an output medium. Check under the menu "Function" → Batch output → Output medium that the option "No output medium" has been selected. (see section 5.6) • Check the cable connection between the printer and the autoclave. • Check the power supply to the printer. In the

Warning message	Cause/Remedy
<div style="border: 1px solid black; padding: 5px; text-align: center;"> Protocol memory full </div>	<p>MELAprint® 42 the red light should indicate 'power on'</p> <ul style="list-style-type: none"> The printer may be "Offline". Select "online" (MELAprint® 42, press "SEL" button, green LED "SEL" should shine) <p>The internal protocol memory is full (40 cycles), a output medium is registered, and in the menu Function → Batch output → the option "Immed. output? NO" is selected. The message is displayed when a program is started. Pressing the "Start/Stop" key again deleted the message and the program starts:</p> <ul style="list-style-type: none"> You can continue operations simply by pressing the "Start/Stop" key twice when you start a program. Select "Immed. output? YES" (see section 5.7.1) Delete stored logs (see section 5.7.5), if necessary print-out all stored cycle logs first (see section 5.7.4) <p>In the menu Function → "Batch output" → "Output medium", select the "No output" option (see section 5.6)</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> Execute service please </div>	<p>The service message is activated after a certain number of batches or a set operating period, when a service is due. The message appears before the start of every program. If you press the "Start/Stop" key again the message is deleted and the program starts.</p> <ul style="list-style-type: none"> You can continue operations, by simply pressing the "Start/Stop" key twice when you start a program. Have a service carried out as recommended by an authorised MELAG servicing company or your specialist dealer. <p>The cycle counter for servicing should be reset during the service.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> Test unsuccessful Leak rate: 3.2 </div>	<p>The leak rate during the vacuum test exceeds the limit value:</p> <ul style="list-style-type: none"> Check and if necessary clean the door seal and the rim of the chamber Repeat the vacuum test with a completely cold autoclave <p>If no other malfunction messages occur during operation, you can continue to use the autoclave until the regular service, when the cause of the leak will be identified.</p>

9.2 Malfunction messages

Malfunctions are generally reported by an "Error" on the display with the number of the error and its short name.

Malfunction messages may occur without a program start (when the power is switched on or soon after), or during a program.

If errors are reported during a program, then in addition to the error report the program will also be stopped. This may be accompanied by the equilibration of the pressure in the autoclave, and in this case the error message will alternate with the messages "Pressure release", or "Ventilation", and "End".

After the termination, the display will alternately show the error message and "Acknowledge with button '-'" and then "Stop/End". Pressing "-" deleted the error message (if the error is not permanent). Until you have quit the malfunction message the autoclave door cannot be opened. If a program has been prematurely terminated in this way the autoclave load must always be regarded as being **not sterilized**. We recommend that you unload the autoclave, carry out a sterilization cycle without any load (the drying may be impaired for this first cycle) and then reload the autoclave and repeat the interrupted operation cycle.

If an output medium is connected and "Immed. output? YES" is selected, a log will automatically be printed out at the end of the termination.

The log output shows the full name of the error, and if a program has been interrupted before completion it will also show "Load not sterile". The following list gives malfunction messages, the cause and possible remedies.

Error messages	Causes/Remedy
Malfunction 1: Vacuum system	<p>The monitoring time for reaching the evacuation pressure for the individual pressure cycles, pressure release, or for reaching the minimum drying pressure has been exceeded:</p> <ul style="list-style-type: none"> Check that the door seal and the lip of the opening to the pressure chamber are intact and clean. Check that the outflow of condensate is not obstructed by fallen instruments, pieces of filter paper, etc. on the floor of the pressure chamber. Check for leaks using the "Vacuum test" program. If this occurs repeatedly, inform your specialist dealer.
Malfunction 2: Steam generator	<p>The monitoring time for a heating phase or for reaching the sterilization pressure has been exceeded:</p> <ul style="list-style-type: none"> Maximum load exceeded Voltage of mains power supply is too low; check mains supply; try autoclave on different power circuit. <p>If this occurs repeatedly, inform your specialist dealer.</p>
Malfunction 4: Pressure release	<p>The monitoring time for pressure release was exceeded:</p> <ul style="list-style-type: none"> Check that the cooling water outflow allows steady drainage, without kinks. <p>If this occurs repeatedly, inform your specialist dealer.</p>
Malfunction 6: Ventilation	<p>The monitoring time for the ventilation of the pressure chamber was exceeded.</p> <ul style="list-style-type: none"> The sterile filter is clogged, there will have been an earlier warning message (see section 9.1). Exchange filter.
Malfunction 8: Time base	<p>Maximum difference between the program duration and the internal clock exceeded:</p> <ul style="list-style-type: none"> If this occurs repeatedly, inform your specialist dealer.
Malfunction 9: Door open	<p>Door not closed properly</p> <ul style="list-style-type: none"> Press grip down until contact is made (display should then show "Door closed")! <p>If this occurs repeatedly, inform your specialist dealer.</p>
Malfunction 10: Overh. steam gener.	<p>The capillary tube level regulator is open at the start of the program (error report immediately after start), or the monitoring time until refilling with demineralized or distilled water during the program (until the end of sterilization) is exceeded:</p> <ul style="list-style-type: none"> This problem can arise because after stopping a program and immediately restarting - wait for two minutes and try starting again. If this occurs repeatedly, inform your specialist dealer.
Malfunction 13: No cooling water	<p>The cooling water pressure switch has closed during the program (see message "Warning! No cooling water" - page 37).</p>
Malfunction 14: No feed water	<p>The flow monitor for the demineralized/distilled water supply does not close during the program (see message "Warning! No feed water" - page 37).</p>

Malfunction 18: Sensor: ... Input: ...	The internal testing of the sensors for temperature, pressure or conductivity showed an excessive deviation, the malfunction can be reported on switching on the autoclave or in the course of a program: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 26: A/D-Converter	The limit deviation for internal analogue/digital signal conversion has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 27: Temp.Sens.def 1,2	The limit deviation between the two sensors for the steam temperature has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 31: System leak	During the Vacuum test program the pressure was too high (very large leak): • Repeat the vacuum test, and if there is another malfunction message inform your specialist dealer.
Malfunction 32: Power failure	After starting the program there was a loss of power. The error report is received when the electricity supply is restored: • Check the mains power supply installation, if no errors can be found, inform the service agent. If there is a loss of power when the chamber is under pressure, then there will be an additional reminder to sterilize the sterile filter, since this may have become moist and non-sterile: • Remove the sterile filter at the rear of the autoclave. • Sterilize the filter using the Quick-Program S. • Then replace the filter.
Sterile filter sterilize	
Malfunction 33: Press. release	The time limit for the steam generator to reach the necessary pressure has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 34: Sterilization TU1	The minimum sterilization temperature has not been reached: • Reduce the size of the load. • If this occurs repeatedly, inform your specialist dealer.
Malfunction 35: Sterilization TO1	The maximum sterilization temperature has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 36: Sterilization DU	Sterilization pressure falls below the minimum level: • Reduce the size of the load. • If this occurs repeatedly, inform your specialist dealer.
Malfunction 37: Sterilization DO	The maximum sterilization pressure has been exceeded: • If this occurs repeatedly, inform your specialist dealer.
Malfunction 38: Sterilization TD1	The difference between measured and theoretical temperature is too large: • If this occurs repeatedly, inform your specialist dealer.

WARNING! Overtemp. display	<p>Defective cooling fan, defective temperature sensor (Input 4), air supply to the cooling fan at the back plane is covered or hindered e.g. by extreme soiling or dust</p> <ul style="list-style-type: none"> • Check if the vent opening at the back plane of the autoclave is covered or hindered • Let the autoclave cool down for 30 – 60 min, then restart the autoclave <p>If this occurs repeatedly, inform your specialist dealer or After-sales Service</p>
Malfunction 50: Motor protect. V-pump	<p>The message is displayed at the start of a program, if the protective motor switch (DIN 7) triggers –Start of a program not possible.</p> <p>An error log is putted out. Possible causes: stiff vacuum pump poss. because of calcification</p> <ul style="list-style-type: none"> • Actuate motor protecting switch (see page 8, Fig. 2) • If necessary exchange the device fuses 16A/FF <p>If this occurs repeatedly, inform your specialist dealer or After-sales Service</p>
Malfunction 51: TU2	<p>The minimum sterilization temperature has not been reached (at temperature sensor 2):</p> <ul style="list-style-type: none"> • Reduce the size of the load. • See malfunction 34 <p>If this occurs repeatedly, inform your specialist dealer or After-sales Service</p>
Malfunction 52: TO2	<p>The maximum sterilization temperature (temperature sensor 2) has been exceeded:</p> <p>If this occurs repeatedly, inform your specialist dealer or After-sales Service.</p> <ul style="list-style-type: none"> • Also see malfunction 35
Malfunction 53: TD2	<p>The difference between the theoretical temperature , quoted from the pressure sensor signal, and the temperature measured at temperature sensor 2 is too large:</p> <p>If this occurs repeatedly, inform your specialist dealer or After-sales Service.</p> <p>Also see malfunction 38</p>

9.3 Reaction to warnings/error messages

The Cliniklav®25 has a number of safety features and an extensive integrated control and monitoring system, in order to ensure the greatest possible level of safety for the sterilization process, and to eliminate risks for the patients and operators.

Various aspects of the operation of the autoclave, such as pressure and temperature sensors are automatically checked when the autoclave is switched on.

The power supply, and the quantity and quality of the feed water and cooling water are checked before a program can start.

A successful program start is followed in the next stages by the monitoring of all parameters of relevance for the sterilization. If any limit values for the individual program phases are exceeded then there is a malfunction report and the program is automatically interrupted.

In addition to messages, warnings or malfunction messages on the display, if a printer or another output medium is connected then a log output will provide details of the type of malfunction and when it occurred.

If any such warning message occurs then you should consult section 9, which provides detailed advice and possible operational errors.

9.4 No display on the screen

After switching on the autoclave, the display should show the initial setting (see section 8).

If there is no display, check:

1. Is the cable plugged into the mains?
2. Is the mains supply O.K. (if necessary check with another appliance)?
3. Check the three mains fuses. These fuses are installed behind the door. Since the electric door opening function may in such a case also no longer function, then please proceed as described under section 9.5.

Disconnect the power cable and remove the screw caps over the fuses using a screwdriver or a coin. Exchange the fuses (three reserve fuses are delivered with the autoclave) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG Art.-No. 57590).

9.5 Emergency measure if the electric door release button fails

In the unlikely event that the electric door system should fail: In such a case, you can use the crank handle delivered with the autoclave to open the door as follows:

12.1 Remove the cap (12) from the emergency door-opening socket.

12.2 Insert the crank handle into the socket that is now open.

To **open** the door, turn the crank to the left (counter-clockwise, or anti-clockwise): see Fig. 7 below.

To **close** the door, turn the crank to the right (clockwise).

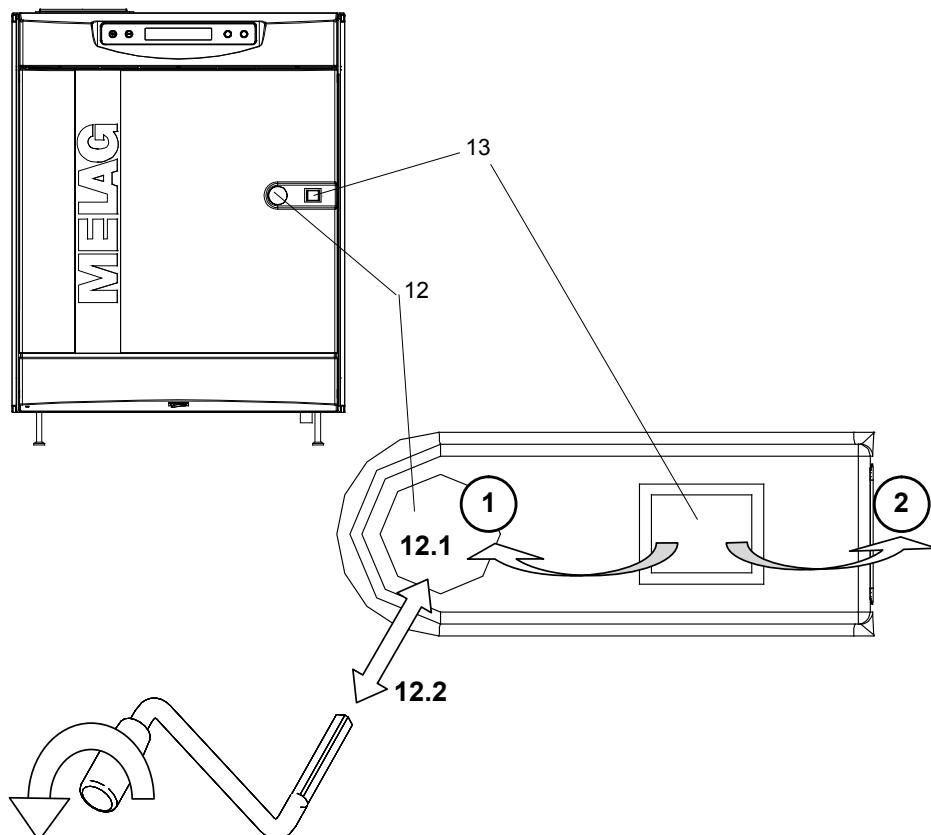


Fig. 7: Emergency operation of the door latch

WARNING: If you use the crank handle to open the door, it is very important to pull out the crank **BEFORE** the door is completely open. If you open the door completely before pulling out the crank handle, this will damage the plastic door.

9.6 Too large feed water consumption

The consumption of distilled or demineralized water will vary depending on the program and the load in the autoclave. If much more water is consumed than the amount specified in the appendix (see section 0), then you should:

1. Check to make sure that you have loaded the sterilization chamber correctly (for example, you may have loaded too much material that soaks up a great deal of water).
2. Check that the condensate outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
3. If neither of these measures help to reduce water consumption, please inform your specialist dealer.

4. Bad drying results

Good drying not only depends on the correct operation of the autoclave, but also on the way the autoclave is loaded. If drying is not satisfactory:

1. Check to make sure that the condensate can flow out properly: check to ensure that the autoclave is correctly connected (for example, make sure that there are no kinks in the drain hose).
2. Check that the condensate outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
3. Check that the maximum load has not been exceeded (particularly for textiles), that the autoclave has been loaded properly (no direct contact with the walls of the pressure chamber), and that the appropriate mounting has been used (see section: 4.3 and 11.4)
4. Only start the autoclave when the chamber is heated up.
5. Start with "Additional drying" (see section 4.6)
6. If none of these measures help to reduce water consumption, please inform your specialist dealer.

9.7 Program modifications

The standard programs are designed to meet most practical operational needs (subatmospheric pulsing, heating, sterilization, pressure release, drying, and ventilation) and to display the parameters of most interest (pressure, temperature, time).

The operator is responsible for ensuring that the autoclave is not overloaded, and that the load is arranged properly to ensure good drying. There is the standard option "Additional drying".

Any further program modification to suit specific individual requirements should only be carried out by authorised personnel, after consultation with your dealer or with the experts at MELAG.

10 Important information regarding routine operation

The former DIN 58946-6 and future DIN 58946-7 both prescribe the following fundamental procedures for routine operation the autoclave:

Time of test	Nature of test
Before starting routine operation	Installation Qualification (IQ) Operational Qualification (OQ) Performance Qualification (PQ)
Daily	<p>Visual inspection</p> <ul style="list-style-type: none"> • Check of the sterilization chamber and seal for its correct condition, see section 7.1 • Check of the operating materials, see section 4.1. • Check of the operation readiness of the recording equipment, see section 5.3. <p>Feed water quality:</p> <ul style="list-style-type: none"> • see section 7.4 and 8.1 <p>Bowie & Dick test (steam penetration):</p> <ul style="list-style-type: none"> • Also see section 3.4
Monthly	Vacuum test
Annually or following 1000 cycles	Maintenance
After changes to the autoclave and its maintenance	Operational Qualification (OQ)
After changes to the configuration	Renewed performance qualification (PQ) for a particular reason
In regular intervals (in accordance with DIN EN 17665, section 12.4)	Renewed performance qualification (PQ)

11 Appendix

11.1 Technical Data

Device type	Cliniklav®25	
	Table-top device	with floor unit
Device dimensions (HxDxW)	80 x 62 x 80 ¹⁾ (84) cm	150 x 62 x 80 (84) cm
Sterilization chamber (HxDxW)	32 x 32 x 65 cm	
Effective capacity	30 x 30 x 60 cm	
Volume of the sterilization chamber	1 StU	
Weight (empty)	157 kg (197 kg
Electrical connection	400 V 3N~/AC, 50/60 Hz ~	16 A separate fuse, FI protection 30 mA
Electrical operating level	9000 W	
Max. sound power	< 70 dB(A)	
Heat emission	ca. 4 MJ	
Max. altitude	2000 m	
Ambient temperature	5-40 °C (recommended max. 25 °C)	
Relative humidity	80% at 31 °C, decreasing in a linear fashion up to a relative humidity of 50% at 40 °C	
CE marking	CE 0197, CE 0035	
Degree of protection (following IEC 60529)	IP20	
Cold water connection		
Min. Flow pressure	2.5 bar at 7 l/min	
Qualiy	Drinking water, water hardness 4-12° dH (in accordance with DIN EN 285)	
Feed water		
Flow pressure	min. 2.5 bar	
Consumption per cycle	2.6-6.5 l	
Volume of water storage container	15 L	
Quality	Distilled or demineralized water in accordance with DIN EN 285, Appendix C (with central demineralization system max. conductivity 5 µS/cm)	

1) incl. device feet

11.2 Additional technical data

Dimensions:	Depth	Width	Height	The unit holds:
Tray	60 cm	30 cm	5 cm	4 each
Standard-tray cassette	29 cm	19 cm	4 cm	18 each
Sterilizing container 1 STE				1 each
Sterilizing container 1/2 STE				2 each
Sterilizing container 1/4 STE				4 each

Maximum load:	15 kg instruments
	7 kg Textiles

Program differences:			
Type of loading: Program:	Instruments wrapped	Instruments unwrapped	Textiles
Universal-Program	1 kg ... 15 kg	1 kg ... 15 kg	1 kg ... 7 kg
Quick-Program B	max. single wrapped 5.5 kg	1 kg ... 15 kg	max. wrapped 4 kg
Quick-Program S	----	1 kg ... 15 kg	----
Gentle-Program	1 kg ... 15 kg	1 kg ... 15 kg	1 kg ... 7 kg
Prion-Program	1 kg ... 15 kg	1 kg ... 15 kg	1 kg ... 7 kg

Average power consumption:		
Program	Energy consumption	Conditions
Universal-Program	approx. 3.4 ... 3.6 kWh	1 kg ... 15 kg load
Quick-Program B	approx. 2.2 ... 3.2 kWh	1 kg ... 5,5 kg load
Quick-Program S	approx. 1.57 ... 2.1 kWh	1 kg ... 15 kg load unwrapped
Gentle-Program	approx. 2.8 ... 3.6 kWh	1 kg ... 7 kg load
Prion-Program	approx. 2.8 ... 4.0 kWh	1 kg ... 15 kg load
Bowie & Dick Test	approx. 3.0 kWh	reduced standard test package 4 kg
Vacuum test	approx. 0.02 kWh	Chamber without any load
Quick-Program S for pre-heating the chamber	approx. 1.73 kWh	Chamber without any load

Average power consumption (porous partial load):		
Program	Energy consumption	Conditions
Universal-Program	approx. 4.08 kWh	4 kg porous partial load
Quick-Program B	approx. 3.7 kWh	4 kg partial load
Quick-Program S	---	---
Gentle -Program	approx. 3.5 kWh	4 kg partial load
Prion-Program	approx. 4.3 kWh	4 kg partial load
Bowie & Dick Test	approx. 3.0 kWh	reduced standard test package 4 kg

Average cooling-water consumption (with drying):		
Program	Cooling water consumption	Conditions
Universal-Program	approx. 65 ... 66 l	1 kg ... 15 kg load
Quick-Program B	approx. 43 ... 57 l	1 kg ... 5,5 kg load (single wrapped)
Quick-Program S	approx. 35 ... 37 l	1 kg ... 15 kg load unwrapped
Gentle-Program	approx. 65 ... 69 l	1 kg ... 15 kg load
Prion-Program	approx. 60 ... 71 l	1 kg ... 15 kg load

Average feed-water consumption (normal setting with steam generator cleaning):

Program	Feed water consumption	Conditions
Universal program	approx. 4.4 ... 5.8 l	1 kg ... 15 kg load
Quick-Program B	approx. 4.0 ... 5.5 l	1 kg ... 5.5 kg load (single wrapped)
Quick-Program S	approx. 2.3 ... 3.5 l	1 kg ... 15 kg load
Gentle program	approx. 4.8 ... 6.7 l	1 kg ... 15 kg load
Prion program	approx. 4.3 ... 6.5 l	1 kg ... 15 kg load
Bowie & Dick Test	approx. 4.5 l	reduced standard test package 4 kg
Vacuum test	----	chamber without any load

Times, Pressures, Temperatures – Program constants:

Program	Pressure	Temperature	Sterilizing time	Drying time
Universal-Program	2.1 ... 22bar	134 ... 136 °C	3:30 min	20 min.
Quick-Program B	2.1 ... 2.2 bar	134 ... 136 °C	3:30 min	12 min
Quick-Program S	2.1 ... 2.2 bar	134 ... 136 °C	5:30 min	10 min
Prion-Program	1.1 ... 1.2 bar	121 ... 122 °C	20:30 min	20 min

Variable cycle times with max. load of 15 kg instruments (with complete drying):

Program	Duration of the program	Conditions (at ambient temperature of 20°C)
Universal-Program	approx. 60 ... 61 min	1 kg ... 15 kg load
Quick-Program B	approx. 41 ... 52 min	1 kg ... 5.5 kg load (single wrapped)
Quick-Program S	approx. 31 ... 34 min	1 kg ... 15 kg load unwrapped
Gentle-Program	approx. 71 ... 78 min	1 kg ... 15 kg load
Prion-Program	approx. 67 ... 80 min	1 kg ... 15 kg load

Variable cycle times (without drying):

Program	Duration of the program	Conditions (at ambient temperature of 20°C)
Universal program	approx. 38 ... 40 min	1 kg ... 15 kg load
Quick-Program B	approx. 28 ... 40 min	1 kg ... 5.5 kg load (single wrapped)
Quick-Program S	approx. 20 ... 22 min	1 kg ... 15 kg load unwrapped
Gentle-Program	approx. 49 ... 56 min	1 kg ... 15 kg load
Prion-Program	approx. 45 ... 58 min	1 kg ... 15 kg load

11.3 Nominal value tolerances

Step	Universal-Pr.		Quick B		Prion-Pr.		Gentle-Pr.		Quick S		◀ same meaning as in Universal-Pr.	
	Press. P	Tolerance	P	Tol.	P	Tol.	P	Tol.	P	Tol.	All values in mbar	
1. F.	80	+ 50/- 20	◀	◀	◀	◀	◀	◀	110	◀	evacuate	Fractionation
	1400	+ 50/- 30	◀	◀	◀	◀	◀	◀	◀	◀	steam entry	
2. F.	160	+ 50/- 20	◀	◀	◀	◀	◀	◀	230	◀	evacuate	
	1400	+ 50/- 30	◀	◀	◀	◀	◀	◀	◀	◀	steam entry	
3. F.	160	+ 50/- 20	◀	◀	◀	◀	◀	◀	---	---	evacuate	
	1400	+ 50/- 30	◀	◀	◀	◀	◀	◀	---	---	steam entry	
4. F.	160	+ 50/- 20	◀	◀	◀	◀	◀	◀	---	---	evacuate	
	1400	+ 50/- 30	◀	◀	◀	◀	◀	◀	---	---	steam entry	
	3050	+ 70/- 30	◀	◀	◀	◀	2060	◀	◀	◀	heat up	
	3050	+ 70/- 30	◀	◀	◀	◀	2060	◀	◀	◀	sterilization start	
	3160	+ 90/- 90	◀	◀	◀	◀	2115	◀	◀	◀	sterilization	
	1200	+ 30/- 90	◀	◀	◀	◀	◀	◀	◀	◀	pressure release	

11.4 Instructions for drying

The Cliniklav®25 provides very good drying standards for sterilized items. Particularly difficult drying tasks (e.g. double wrapping) can also be dried to very good standards with the help of the supplementary drying function and the automatic pre-heating. Please read the following sections, which may help you to optimise your drying results.

11.4.1 Drying in sterilization containers

In the autoclave steam is produced by heating water. The steam transfers heat to the instruments and sterilization container and warms these. This leads to steam condensing on the instruments and containers.

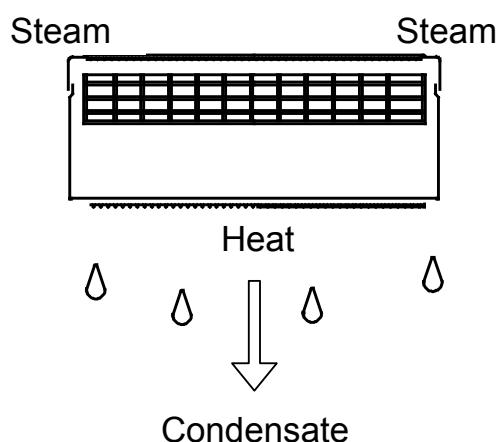


Fig. 8: Formation of condensation on the sterilization container

The steam also heats the objects contained in the sterilization containers. Condensate forms on the objects being sterilized, and some of the condensate drops to the bottom of the sterilization container.

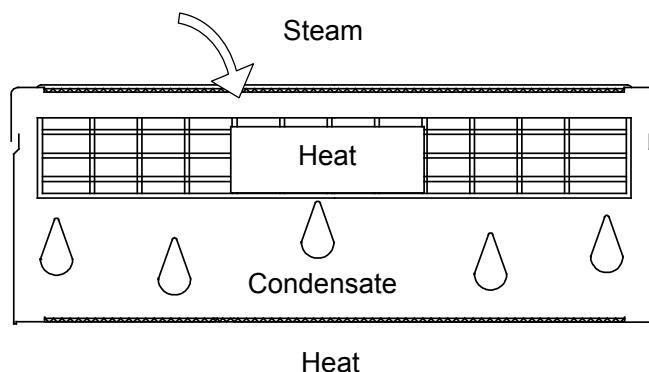


Fig. 9: Formation of condensation on sterilized objects

After sterilization, during the drying phase, all the condensation must evaporate from the sterilization container and from the sterilized items themselves. This is achieved by the transfer to the condensate of heat stored in the walls of the sterilization container and in the sterilized items themselves. It is preferable that the sterilization container be made of aluminium, as this metal stores and conducts heat well, ensuring faster drying than other materials.

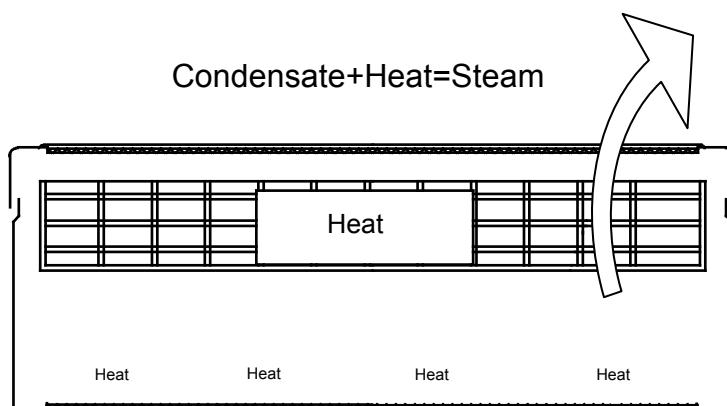


Fig. 10: Drying

For good drying it is essential that surplus heat be transferred to the objects which have been sterilized. In addition, the condensate must be led out of the sterilization containers. The floor of the containers have channels and the lid has an arched filter area.

11.4.2 Textiles

When preparing textiles for treatment in the autoclave, care must be taken that the folds in the textiles are arranged in parallel, and that the items are packed side-by-side. This vertical configuration ensures that channels can form between the textile folds for the air to flow out and steam to flow in. Do not stack textiles on top of each other as this hinders the penetration of steam into the packages of textiles.

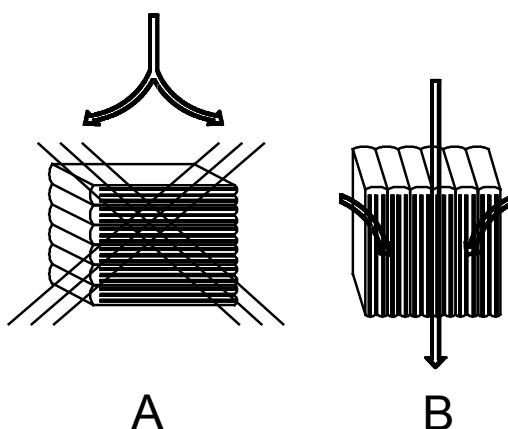


Fig. 11: Loading textiles properly

When loading sterilization containers with textile items, care should be taken to ensure that they retain their vertical orientation, but that the items are not squashed together. This would prevent the formation of flow channels for air and steam. If the packages of textiles cannot be kept upright, then it might be advisable to wrap them in sterilization paper.

The textiles must not touch the sides or the base of the sterilization container, since they might become saturated with condensate.

For good drying results, the textiles should also be as dry as possible when they are placed in the autoclave. The heat stored in the chamber and sterilization container may not otherwise be sufficient to evaporate both the moisture and condensate.

11.4.3 Instruments

Where appropriate, instruments should be disassembled before placing them in the autoclave, as this will improve the drying results.

The use of lubricants (such as instrument oil) should be avoided unless absolutely necessary. Prior confirmation should be obtained from the manufacturer of such agents that they are in fact suitable for steam sterilization. Substances which are hydrophobic or impenetrable for steam can not only lead to poor drying results, but may also mean that the steam sterilization is unsuccessful, since not only the instruments are protected but also micro-organisms.

11.4.4 Loading the autoclave

Textiles and instruments should not be sterilized together in one sterilization container. Textiles and instruments in separate sterilization containers should as far as possible not be sterilized in the same load. However, where this is unavoidable for economic or other reasons, the following rules should be observed:

- Instruments and sterilization containers should be placed at the bottom
- Textiles should always be placed at the top
- Transparent sterilization packages and paper sterilization packages should be placed at the top (except when in combination with textiles, in which case they must be at the bottom).

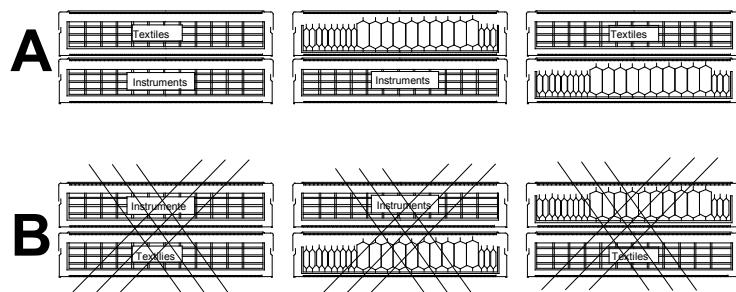


Fig. 12: Loading the autoclave

11.4.5 Loading containers with soft sterilization packing material

"Soft" sterilization packages such as paper bags or transparent sterilization packages can be sterilized either in sterilization containers or sterilization baskets. To enable better drying, arrange such soft sterilization packages side-by-side and close to each other. This allows condensation to run off the packages, while at the same time preventing them from expanded excessively, and possibly bursting at the seams.

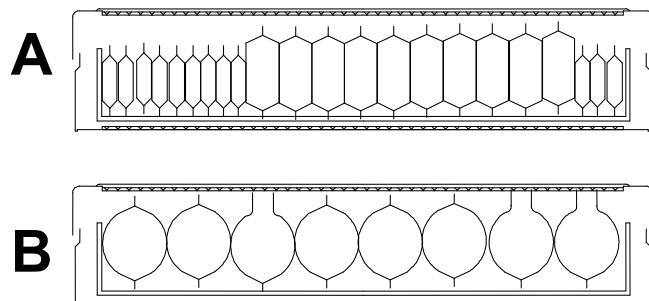


Fig. 13: Packing "soft" sterilization packages in sterilization containers

11.4.6 Stacking sterilization containers

When arranging sterilization containers, care should be taken that drops of condensate do not wet items being sterilized beneath, but can flow away to the base of the chamber. The best arrangement is a stack of sterilization containers of the same size, so that condensate can flow down the sides.

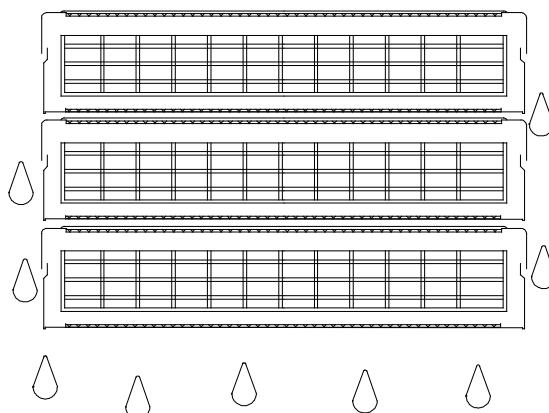


Fig. 14: Stacked sterilization containers

11.4.7 Removing the sterilized items

Immediately after the sterilization process, some condensate may remain on the sterilized items. However, heat transfer from the sterilized objects can evaporate this after the sterilization process has been completed.

The German standard DIN 58953 Part 7 Section 7 comments on residual moisture on paper bags or transparent sterilization paper after sterilization: "...Small amounts of water on the surface of packages do not represent a cause for concern if they dry completely within thirty minutes after removal from a steam sterilization system...."

11.4.8 Improving the drying

The drying can be improved by the following measures:

- Pre-heating the autoclave (empty sterilization)
- Arranging transparent sterilization and paper packing vertically
- Selecting the program option "Additional drying"
Extending the drying times (please consult your MELAG customer service).

User Manual

for the Autoclave

Euroklav® 23V -S

with device software version 3.20 et sqq.

Dear Doctor:

Thank you very much for the trust which you have shown by purchasing this autoclave.

For more than 55 years now, MELAG — a medium-sized family-owned and -operated company — has specialized in the production of sterilization equipment for medical practice. During this period, MELAG has succeeded in becoming a leading manufacturer of sterilization equipment. More than 400 000 MELAG units sold throughout the world testify to the exceptional quality of our sterilizers. — which are manufactured exclusively in Germany.

As all other MELAG products, this autoclave was manufactured and tested according to strict quality criteria. Before placing this unit into operation, please read this User Manual carefully. The long-term functional effectiveness and the preservation of the value of your autoclave will depend on careful preparation of instruments before sterilization, and on proper care of the unit.

The staff and management of MELAG



To ensure the functional effectiveness of this unit and to preserve its value:

1. Prepare the instruments to be sterilized carefully
2. Take proper care of the autoclave
3. Use only pure distilled or demineralized water

CONTENTS

1 DESCRIPTION OF THE UNIT	4
1.1 Views of the unit	4
1.2 Control panel	5
1.3 Technical data	5
1.4 Performance features of this autoclave	5
1.4.1 Prevacuum procedure combined with pulsed flow method	5
1.4.2 Sterilization categories	5
1.4.3 Integrated steam generation	5
1.4.4 One-way/Closed-loop system/ Conductivity measurement/ Automatic water refilling	5
1.4.5 Electronic Parameter Control EPS	6
1.4.6 Combined pressure pulsing and vacuum drying	6
1.4.7 Pre-heating	6
1.4.8 Documentation	6
2 INSTALLATION	6
2.1 Setting up the autoclave	6
2.2 Transport ribbons	6
2.3 Levelling	7
2.4 Mains power supply	8
2.5 Outlet connection for one-way water	8
2.6 Internal water supply with demineralized/distilled water	8
2.7 Connection of a water purification system	8
3 INITIAL START-UP	8
3.1 Printer connection/ Initialization (optional)	8
3.1.1 Connecting the MELAprint®42	8
3.1.2 Initialization of the printer / Setting up immediate print-out	8
3.2 Vacuum test	9
3.3 Test run	10
3.4 Installation record	10
3.5 Safety instructions	10
4 INSTRUCTIONS FOR ALL STERILIZATION PROCEDURES	11
4.1 Electricity and water supplies	11
4.1.1 Distilled or demineralized feed water	11
4.1.2 Power supply	11
4.2 Preparing instruments for sterilization	11
4.3 Loading the autoclave	12
4.4 Closing the door	13
4.5 Program selection	13
4.6 Program start	14
4.7 Program progress	14
4.8 Print-out record	16
4.9 Removing the sterilized items	17
4.10 Sterile storage	17
4.11 Sterilization frequency / pauses	17
4.12 Manual termination of program	18
4.12.1 Termination of sterilization	18
4.12.2 Terminate drying	19
4.13 Reaction to warnings / error messages	20
4.14 Operational pauses	20
5 CLOSING DOWN / TRANSPORT / REINSTALLATION	20
6 SPECIAL FUNCTIONS	21

6.1 Water quality (conductivity)/ Chamber preheating temperature.....	21
6.2 Selecting extra drying	21
6.3 Records / Load documentation.....	21
6.3.1 Record print-out.....	21
6.3.2 Immed. print-out? Yes/No	23
6.3.3 Printing out stored records	24
6.3.4 Print all stored cycle records	25
6.3.5 Display printer memory status.....	26
6.3.6 Deleting cycle records	27
6.3.7 Test print-out	28
6.4 Resetting date and time.....	29
6.5 Automatic preheating.....	30
6.6 Total load count	31
6.7 Distilled / demineralized water supply	32
6.8 Water system.....	33
6.9 Program modifications.....	33
7 OPERATIONAL ERRORS / MALFUNCTIONS.....	34
7.1 What to do if the autoclave malfunctions.....	34
7.2 Malfunctions without display messages	34
7.2.1 No display	34
7.2.2 Excessive water consumption	34
7.2.3 Poor drying	34
7.3 Warning messages.....	35
7.4 Error reports.....	38
8 TAKING CARE OF YOUR AUTOCLAVE	42
8.1 Preparation of instruments	42
8.2 Rust formation = Drag-in rust	42
8.3 Taking care of the Euroklav®23V-S	43
8.3.1 Cleaning	43
8.3.2 Use of demineralized or distilled water.....	43
8.4 Checking the operation of the autoclave	44
8.4.1 Safety with automatic monitoring	44
8.4.2 Periodical bacteriological testing (twice a year)	44
8.4.3 Maintenance recommendations	44
9 ANNEX.....	45
9.1 Installation options	45
9.2 Additional technical data.....	46
9.2.1 Capacity / Weight	46
9.2.2 External supplies	46
9.2.3 Operational parameters.....	46
9.3 Instructions on drying	47
9.3.1 Drying in sterilization containers.....	47
9.3.2 Textiles 48	
9.3.3 Instruments.....	49
9.3.4 Loading the autoclave	49
9.3.5 Loading containers with soft sterilization packing material	49
9.3.6 Stacking sterilization containers	50
9.3.7 Removing the sterilized items	50
9.3.8 Improving the drying	50

1 Description of the unit

1.1 Views of the unit

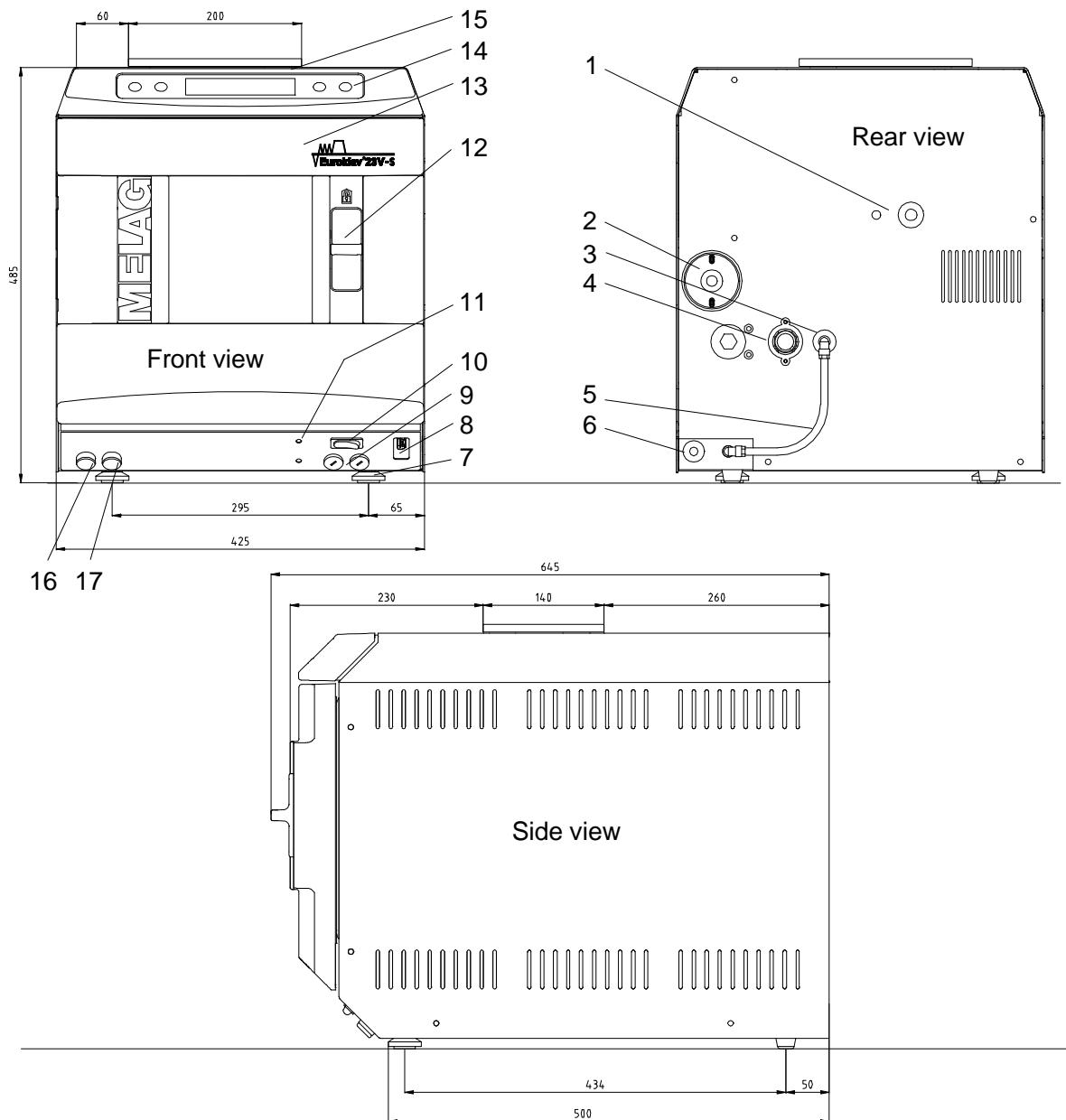


Fig. 1 Views of the Euroklav®23V-S

1	Safety valve I	9	Fuses - 2 x 16 A / FF
2	Sterile filter	10	Power switch
3	Connection for internal distilled / demineralized water supply	11	Overheating trip-switch, steam generator
4	One-way water outlet (3/4")	12	Sliding door lock
5	Pipe connection for internal demineralized / distilled water supply	13	Door (left side hinge)
6	Mains power cable	14	Control panel
7	Adjustable front feet	15	Tank lid
8	Serial data and printer port (RS 232)	16	Outlet connection for wastewater
		17	Outlet for distilled / demineralized water

1.2 Control panel

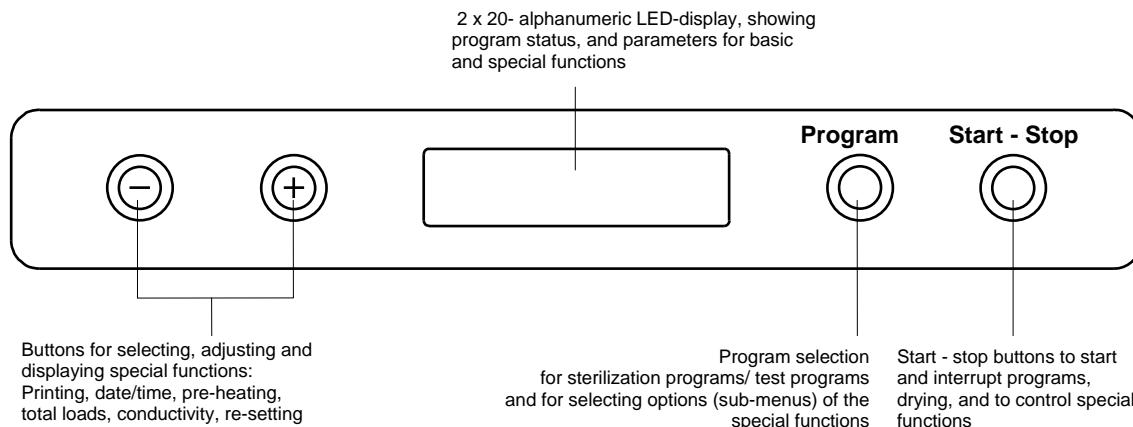


Fig. 2 Control panel Euroklav®23V-S

1.3 Technical data

Sterilization space (diameter x depth)	:	25cm x 47cm
Electric power supply	:	3000W / 230V AC / 16 A / 50....60Hz
Sterilization pressure / temperature	:	2bar/134°C; 1bar/121°C
Maximum load:	:	4kg instruments or 1kg textiles

Further technical details are included in the Annex

1.4 Performance features of this autoclave

1.4.1 Prevacuum procedure combined with pulsed flow method

With the pre-vacuum procedure, most of the air is evacuated from the sterilization chamber and the load in a first step.

Then the pulsed flow method is used in which steam flows into and then out of the autoclave to ensure effective penetration of the items to be sterilized by superheated steam.

This makes it possible to carry out demanding sterilization tasks rapidly and reliably, such as for example the sterilization of wrapped instruments or textiles.

The steam penetration can be tested by implementing a special test program for the Bowie & Dick Test, which is the standard test for large-scale sterilization operations..

1.4.2 Sterilization categories

The Euroklav®23V-S features three sterilization programs for temperatures at 134°C: the "Universal Program" (for wrapped objects), the "Prion Program" (a special Universal Program), the "Fast Program" for unwrapped items, and the "Gentle Program" (a sterilization program for textiles and rubber articles at 121°C). The user can at any time perform additional functional checks of the autoclave by running the Bowie & Dick Test for steam penetration, and the Vacuum Test for leak testing. The additional program "MELAsteam®" is available as an option, and functions at a temperature of 136°C.

1.4.3 Integrated steam generation

The powerful steam generation in the sterilization chamber makes it possible to sterilize large loads of instruments or textiles in a short time. This system of steam generation means that excess temperatures in the sterilized chamber are not possible.

1.4.4 One-way/Closed-loop system/ Conductivity measurement/ Automatic water refilling

The Euroklav®23V-S can be operated in the tried and tested one-way system, in which steam, condensed water and all dissolved impurities are led away at the end of every sterilization cycle, and fresh demineralized or distilled water is then used. This is particularly good for all the materials used. However, in some instances it is also important to use less water, and the Euroklav®23V-S can also be used in a water-conserving closed-loop mode. In this case the used water flows from the left side of the double-chamber storage container over the separating wall into the right-hand chamber. This water is then used again in the next sterilization cycle. With the closed-loop operation it is important that the instruments to be sterilized have been very carefully washed and swilled in purified water. The water in the autoclave must also be exchanged once a week.

An integrated electrical conductivity meter monitors the quality of the demineralized or distilled water used to generate the steam. Using the recommended one-way operation for the autoclave, the increased consumption of demineralized or distilled water can be provided by a water purifier such as the MELAdem®47 or MELAdem®40, which can be directly connected to the autoclave.

User Manual Euroklav®23V-S

Provided that the instruments are prepared carefully for the sterilization, stains on the load and soiling of the autoclave itself can be prevented.

1.4.5 Electronic Parameter Control EPS

The microprocessor in the Euroklav®23V-S makes it possible to monitor pressure, temperature and time continuously during a program by Electronic Parameter Control. The overall operating time can then be optimised according the load and the temperature of the autoclave.

The process assessment and monitoring system in the program control compare current process parameters with standard process data and monitors the process relative to limit values for temperatures, times and pressures. This makes it possible to identify faults as they occur, and provides quality assurance for the sterilization process.

1.4.6 Combined pressure pulsing and vacuum drying

This method ensures good drying results even for wrapped instruments.

1.4.7 Pre-heating

By activating the "pre-heating" function, the cold autoclave chamber can be warmed up before sterilization, or the temperature can be maintained between sterilization runs. This reduces the duration of cycles and considerably reduces the formation of condensation, thus improving drying results.

1.4.8 Documentation

The electronic memory stores records of the previous 40 programs.

For effective hard-copy documentation and for checking purposes a MELAprint®42 printer can be connected to print out a record immediately after completion of a program or to print out records from the memory.

2 Installation

When setting-up and installing the autoclave, please consult the separate instruction leaflet "Installing the Euroklav®23V-S".

2.1 Setting up the autoclave

The autoclave should be set up in a dry place which is protected against dust. The base should be stable, and able to support the weight of the appliance (unloaded weight 43 kg). The space required by the autoclave can be seen from the external dimensions (as in Section 1.1). A minimum additional space of 10 cm should be allowed on either side and above the autoclave in order to ensure that heat can escape.

The electrical power supply should be a separate 230V AC circuit with a 16 A fuse.

Should it be decided at some stage to install an automatic one-way water system, it is necessary to have a connection to the wastewater plumbing near the autoclave, preferably a wall outlet (NW 40) or a sink-trap (standard length of outflow pipe 2m, 16 mm width). The work surface on which the autoclave stands must be higher than the outlet, and the outlet pipe must be without bends and twists which could prevent water flowing out freely. At the same time, the work surface must provide convenient access to the autoclave, and the display must be clearly visible.

The autoclave can be supplied with demineralized/distilled water from the integrated two chamber storage tank, with freshwater and wastewater chambers. Alternatively, the Euroklav®23V-S can also be connected to an external water purifier - MELAdem®47 or MELAdem®40 (or an equivalent water purification system). However, please note that this will require additional space.

2.2 Transport ribbons

Take the autoclave out of the packaging by means of the transport ribbons. The ribbons themselves are each removed by undoing two retaining screws, which must then be screwed firmly back in place without washers.

2.3 Levelling

In order to ensure that condensate can drain out of the autoclave (which is important if it is to operate properly) the appliance must have be higher at the front than at the back. The autoclave should first be installed in a horizontal position (this should be checked with a spirit level at the chamber flange) and then the front feet should be extended by giving them five (5) turns.

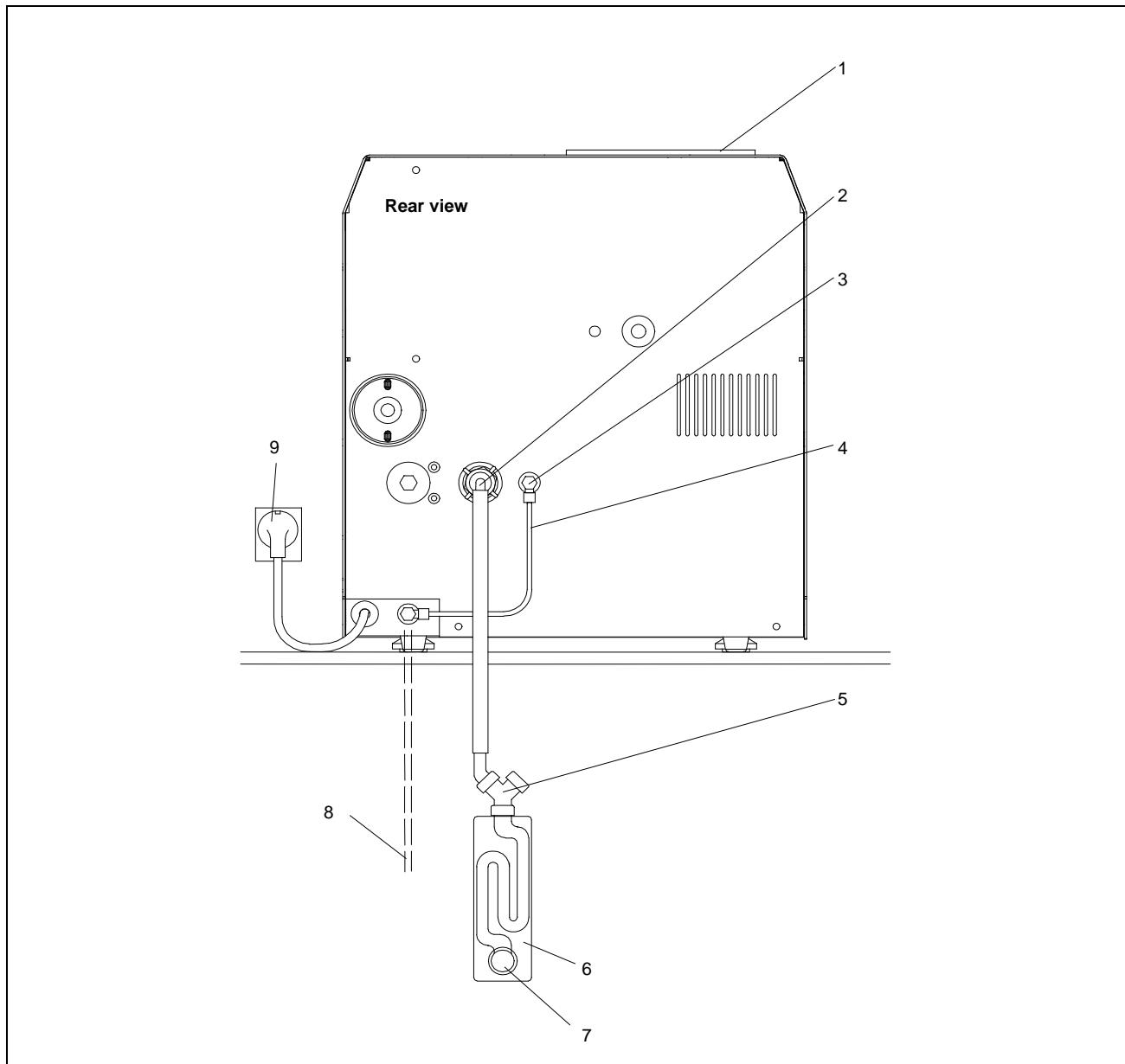


Fig. 3 Installation of the Euroklav® 23V-S with wall-mounted trap

- 1 Tank lid
- 2 One-way outlet
- 3 Connection for internal supply of demineralized/distilled water
- 4 Pipe link for internal supply of demineralized/distilled water
- 5 Y-connection with non-return valve (included in Item 6)
- 6 Wall-mounted trap (MELAG- Art.- No.: 37410)
- 7 Wall outlet (NW 40)
- 8 Supply line for external supply of demineralized/distilled water
- 9 Mains power supply

2.4 Mains power supply

The electric cable of the appliance is plugged into a mains socket rated at 230 V, 50 Hz. The power rating of the autoclave is 3000 W. In order to avoid overloading the electricity supply, we recommend using a separate electrical circuit fitted with a 16 A fuse and optionally protected with a 30mA circuit breaker.

2.5 Outlet connection for one-way water

The connection for the one-way water outlet at the back of the appliance is connected to the drainage system of the building by means of the outlet pipe supplied (textile-reinforced transparent pipe, DN16). It is important that the pipe should have a steady downward gradient, without twists and kinks.

When connecting to a separate outflow pipe NW40, a wall-mounted trap should be used (MELAG Art.-No. 37410, see Fig. 3).

2.6 Internal water supply with demineralized/distilled water

The internal supply of demineralized/distilled water is used for the autoclave in closed-loop operation (see page 44, Fig. 4), the water is extracted from the right chamber of internal water storage tank. The autoclave is supplied with a pipe link with two swivel connections installed to connect the storage tank outlet with the inlet for demineralized/distilled water.

To fill the tank the lid must be removed and the demineralized/distilled water of suitable purity filled into the right-hand chamber until the Max mark.

2.7 Connection of a water purification system

The autoclave can be connected directly to a water purification unit which provides the demineralized or distilled water required (see page 44, Fig. 4). Instead of connecting the feed water inlet to a storage container, it is simply connected directly to the water purification unit.

The reverse-osmosis systems MELAdem®47 and MELAdem®40 are ideally suited to provide the quantity and quality of water needed for the Euroklav®23V-S.

Detailed instructions on the installation of these water purification units are provided in their operating manuals.

When connecting water purification systems from other manufacturers it is very important to ensure that they are able to provide sufficient amounts of water at the required purity. You are generally advised to consult MELAG first.

3 Initial start-up

3.1 Printer connection/ Initialization (optional)

3.1.1 Connecting the MELAprint®42

The autoclave can be connected to an external printer, the MELAprint®42. This is not supplied as standard with the autoclave.

In order to connect the printer to the autoclave follow the description in Section 6.3.1.2.

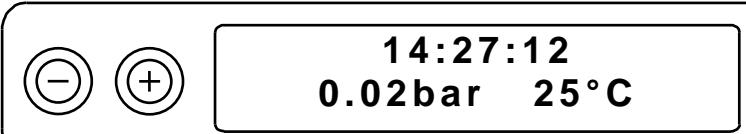
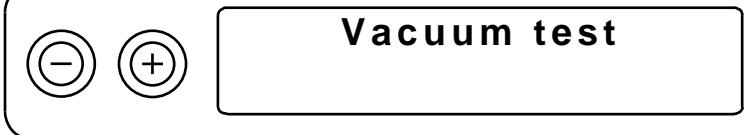
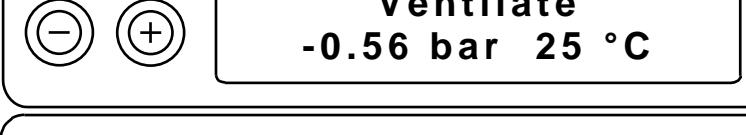
3.1.2 Initialization of the printer / Setting up immediate print-out

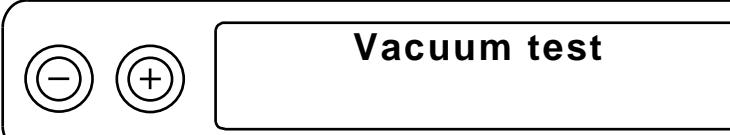
Initialize the external printer (registering with the processing unit of the autoclave) as described in Section 6.3.1.3 .In order to select the immediate print-out option, which means that a record of each sterilization is printed out automatically as soon as it has finished, proceed as described in Section 6.3.1.7.

3.2 Vacuum test

In order to check the operation of the autoclave in the course of the initial start-up, after long periods without being used, or after moves, as well as periodically during routine use, a vacuum test should be carried out to check for leaks.

The vacuum test should be carried out as follows, preferably on the cold autoclave:

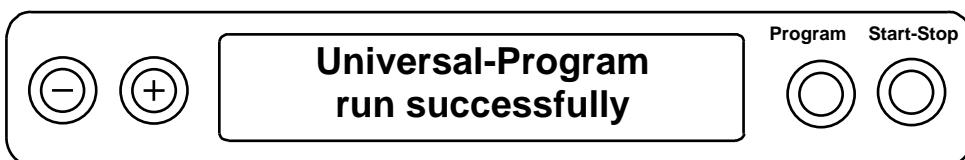
Operation	Display message	Program	Start-Stop
1. Switch on power, then after the message the display will show the basic parameters	 		
2. Close the door			
3. Press the "Program" button several times until the display shows "Vacuum test"			
4. Press "Start - Stop" button			
5. The evacuation pressure has been reached. The equalisation period begins			
6. After waiting for the equalisation (5 min) the measuring period starts (running here e.g. for 7 min 52s)			
7. After the measuring period (10 min) the chamber is ventilated and then the leakage rate is displayed (if the immediate printout option is selected for an attached printer then a record will also be printed) After the message "Please wait Door unlocking" this alternating message will appear:	  		

Operation	Display message
8. Open door	

If the leakage rate is above the limit value, then the display (and the print-out) will also show "Test unsuccessful". In this case, follow the instruction in 7.3.

3.3 Test run

In order to check the operation of the autoclave under realistic conditions, a test run should be carried out with the "Universal Program, 134°C wrapped" and a relevant load. After loading the autoclave and selecting the program with the "Program" button, sterilization is started by pushing the "Start/Stop" button. If the program runs correctly, the following message will appear on the display (see Section 4.7):



with the values for the maximum values for pressure and temperature. If the immediate printout option has been selected for an external printer a record of the program run will be printed.

3.4 Installation record

As documentation that the autoclave has been set-up properly, an installation record should be produced by an authorised person and a copy sent to MELAG. This is important in the event that you wish to make claims under warranty provisions.

3.5 Safety instructions

- ☞ When opening the door, particularly after interrupting the drying process, residual steam can escape from the autoclave chamber.
- ☞ After opening the door, do not touch any metal surfaces - these will be hot! Danger of burns. Always use the tray lifter to remove trays, or wear suitable hand protectors when taking out other items
- ☞ If you install the optional water purifier MELAdem®47 or MELAdem®40 we recommend the installation of a water leak detector (see installation details Section 2).
- ☞ If you intend to install a water purification unit from another manufacturer, then consult MELAG before you do so.
- ☞ The appliance is not suitable for sterilizing liquids.
- ☞ Under current VDE-regulations, this appliance is not suited for use in areas where there are risks of explosion.
- ☞ The appliance must only be serviced and repaired by MELAG or by its authorised representatives (specialist dealers or customer services) using only original parts and following service instructions.
- ☞ Before opening the housing always disconnect from the mains power supply!
- ☞ In order to ensure effective sterilization with the autoclave observe the instructions in this User Manual, and in particular ensure that the loading of the autoclave is appropriate for the program selected.
- ☞ This appliance is only intended for use outside the patient environment (radius 1.5 metres around the treatment location).

4 Instructions for all sterilization procedures

4.1 Electricity and water supplies

4.1.1 Distilled or demineralized feed water

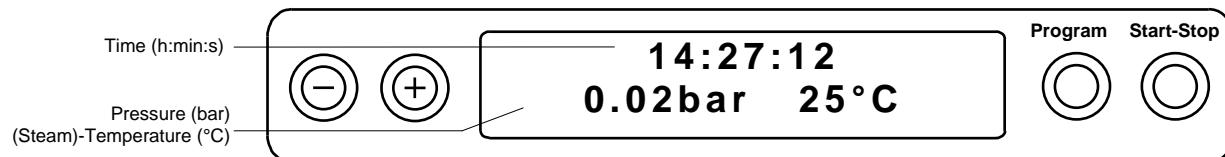
The autoclave automatically monitors the availability of cooling water and purified water, as well as the quality of the distilled / demineralized water before starting a program.

In order to allow an immediate program start and to avoid error reports or interruptions of programs (see Sections: 7.3 and 0) :

- Before the first sterilization at the start of the working day, check that the internal water supply has sufficient water in the right chamber of the double internal tank. If necessary, refill with water of appropriate quality (see Section 8.3.2).
- If the feed water is drawn directly from a MELAdem®47 water purifier, check that its water supply is turned on in good time (this may be up to an hour before starting a sterilization program), if the water supply has been turned off over night, for example.

4.1.2 Power supply

Switch on the power using the switch on the front of the autoclave (bottom right). About 15 seconds after the message "Please wait Door release" the appliance is in the start status:



4.2 Preparing instruments for sterilization

MELAG - rust-free materials

All parts of the Euroklav®23V-S which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust

The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).

Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization

The example of the formation of film rust shows how important it is to prepare items properly before sterilization.

Handpieces and contra-angles must be cleaned before sterilization and maintained (e.g. by oiling).

Other instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103, or similarly strict national codes of practice in a disinfectant and/or cleaning solution at the correct concentration for the correct length of time

MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment for handpieces for contra-angles, as well as thermo-disinfecting devices.

It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. Turbines and handpieces must be oiled in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments

The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.

Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

4.3 Loading the autoclave

It is of crucial importance for effective sterilization and good drying that the autoclave is loaded properly: When loading the autoclave, take account of the following points:

Tray rack

For the Euroklav®23V-S there are 2 types of tray rack:

Type "B" (MELAG-Art.-No.: 40224) for up to 4 trays or 4 standard tray-cassettes

Type "C" (MELAG-Art.-No.: 40242) for up to 6 trays or 3 standard tray-cassettes

Both types of tray rack are also suitable for the MELAG-sterilization containers Type 15K,M,G; Type 17K,M,G,R; Type 23R,M,G, Type 28M,G).

Normally, the autoclave should be used in conjunction with a tray rack, since this ensures that steam penetration and drying are as good as possible. In exceptional situations (e.g. when using sterilization containers from other manufacturers), and after consultation with your specialist dealer or with MELAG, the tray rack can be removed and the container can be placed directly in the autoclave chamber.

For the sterilization of instruments sealed in transparent sterilization wrapping, it is recommended that you use the foil stand MELAG-Art.-No.: 22420. This contributes considerably to the drying process for such wrapped instruments.

Trays

Trays for objects which are to be sterilized must be perforated, in order to allow condensation to run away. MELAG-trays are recommended. If you use dishes or trays without perforations, then the objects being sterilized will not dry properly.

Enclosed sterilization containers

Enclosed sterilization containers must be perforated on at least one side (preferably underneath) or must have valves, in order to ensure that steam can penetrate and condensate can run out. All MELAG-sterilization containers meet these requirements with perforations on two sides and filter-cloth- inlays.

Sterilization containers which only have perforations on the top only allow limited drying.

If sterilization containers are stacked in the autoclave, it is important to ensure that the perforations are not blocked.

Transparent sterilization packaging

If you use transparent sterilization packaging, such as MELAfo®, then the items should if possible be stood vertically on the tray, or sterilized in foil holders (MELAG-Art.-No.: 22420). They should never be laid flat one on top of the other.

If seals split open during sterilization it may be necessary to increase the length of the impulse on the sealing device or to use a double-seal.

Standard tray- cassettes sealed in MELAfol® (250 mm wide) must be taped and clasped additionally to ensure that the side-seals do not split open.

Multiple wrapping

The pulsed vacuum method means it is possible to use multiple wrapping.

Maximum loads

Loads should not exceed 4 kg of instruments or 1 kg of textiles.

Mixed loads

If mixed loads of textiles and instruments are to be sterilized, then as far as possible the textiles should be above the instruments and direct contact with the instruments should be avoided.

Inclusion of textiles and instruments in the same sterilization container is not desirable.

Textiles should never come into direct contact with the walls of the chamber.

If different types of packaging are included in a load, then:

- Instruments and sterilization containers should be at the bottom
- Transparent and paper sterilization packaging should be at the top (but lower than textiles)

Liquids

The appliance is not suitable for the sterilization of liquids!

Suitability for sterilization

Relevant information provided by manufacturers of instruments and textiles about sterilization should be strictly observed.

4.4 Closing the door

The door is closed by lightly applying pressure in the direction of the chamber flange and at the same time pressing down the sliding door catch. The display shows the message:



4.5 Program selection

A program should be selected which is appropriate for the physical properties of the items being sterilized (and in particular their heat resistance) and the type of packaging (if any part of the load is wrapped, then either the "Universal Program" or the "Gentle Program" must be used).

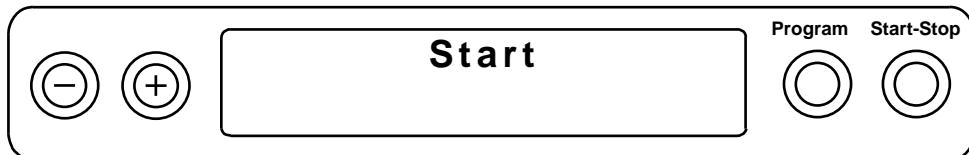
By pressing the "Program selection" button it is possible to review the display of the following programs for selection:

Parameter/Application	Program name/Display message
Universal program at 134°C, 2 bar, and a sterilization time of 3.5 min Sterilization of wrapped items, in particular instruments (no Hollow A), or mixed loads (unwrapped/wrapped)	Universal Program 134°C wrapped Program
Quick Program at 134°C, 2 bar and a sterilization time of 3.5 min Sterilization only of unwrapped instruments (no Hollow A, no textiles) for rapid re-use (drying can be interrupted manually)	Quick Program 134°C unwrapped Program
Gentle Program at 121°C, 1 bar, sterilization time 15 min Sterilization of all types of wrapped items (except Hollow A), in particular large amounts of textiles or thermolabile materials (plastic, rubber), or mixed loads (wrapped/unwrapped)	Gentle Program 121°C wrapped Program
Prion Program (a special Universal Program) at 134°C, 2 bar, and with sterilization time extended to 20 min, for sterilization of wrapped items, especially instruments and/or mixed loads (i.e., packed and unpacked). This program is recommended for sterilization of instruments used in situations in which the danger of infection by pathologically modified proteins is suspected: for example, Creutzfeld-Jacob and BSE).	Prion Program 134°C wrapped 20' Program
MELAsteam Cleaning at 136°C, 2.3 bar, and a maximum cleaning time of 60 min., for the steam cleaning of instruments that have <u>already been disinfected</u> . CAUTION: Use only together with a permanently installed MELAsteam® Pistol (otherwise the system is disabled). See the Operator's Manual for MELAsteam®.	MELAsteam Cleaning 2.3bar 60' Program
Bowie & Dick Test Program at 134°C, 2 bar and a sterilization time of 3.5 min Used to check the operation of the autoclave (Steam penetration of special indicators)	Bowie & Dick Test 134°C 2.2bar 3,5' Program
Vacuum test-program Used to check the autoclave for leaks, from a cold start	Vacuum test Program

Parameter/Application	Program name/Display message
Basic display (no program selected)	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 15:31:33 0.02bar 22°C </div> <div style="text-align: right; margin-top: -10px;"> Program  </div>

4.6 Program start

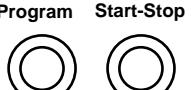
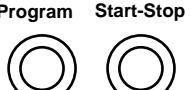
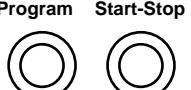
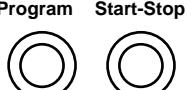
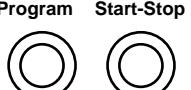
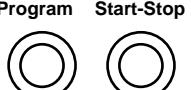
Press the "Start-Stop" button once the desired program is shown on the display. The availability of cooling water, and feed water will be checked automatically, with a conductivity measurement.



At the start of the quick program there will be an additional message "Warning: Only unwrapped instruments". This message must be acknowledged by pressing "Start" again.

4.7 Program progress

After starting the program, it will then progress automatically. The display shows the current program status as follows:

Program status	Display message
1. Pre-vacuum consisting of evacuation (removal of air) until the appropriate evacuation pressure is reached, followed by steam introduction up to slightly above atmospheric pressure. Display shows pressure in chamber and steam temperature	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Pre-vacuum -0.72 bar 60°C </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div>
2. Phase 1 and following Depending on the program chosen and the temperature of the chamber at the start of the program, a number of cycles of steam inflow and outflow follow to ensure adequate penetration of super-heated steam into the items being sterilized.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1. Fractionation 0.69 bar 115°C </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div>
3. Heating phase A heating-up phase follows. The continuous introduction of steam raises pressure and temperature in chamber to the values needed for the program	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Heat up 1.80 bar 117°C </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div>
4. Sterilization phase When the required pressure and temperature have been reached the sterilization proper then begins. The display shows alternately the pressure and temperature and the time remaining.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Sterilization 2.18 bar 135°C </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Sterilization still 2 min 12 sec </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div>
5. Pressure release After completion of the sterilization time, the pressure is released and the steam generator emptied. Pressure and temperature fall.	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Pressure release 0.85 bar 96°C </div> <div style="text-align: right; margin-top: -10px;"> Program  Start-Stop  </div>

Program status	Display message
6. 1st drying phase (Flow drying) After pressure release the drying phase begins. Throughout the drying phases of the program can be ended without an error report, since the sterilization itself has been completed. However, with the exception of the "Quick Program" you should normally wait until the drying is completed..	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Current drying sin. 1' 0.9bar 85°C </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Immediate removal Press STOP </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div>
7. 2nd drying phase (Vacuum drying) The flow drying is then followed by a final pulsed vacuum drying phase. Throughout the drying phases the program can be ended without an error report, since the sterilization itself has been completed. However, with the exception of the "Quick Program" you should normally wait until the drying is completed..	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Vacuum-drying sin. 2' -0.12 bar 60°C </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Immediate removal Press STOP </div> <div style="flex: 1; text-align: right; padding: 10px;"> Programm Start-Stop </div> </div>
8. Program end After ventilation of the chamber the program is completed. If a printer is attached and print-out "yes" is selected, the record will be printed-out immediately. After the door has automatically unlocked the door can be opened to remove the sterilized objects.	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Quick Program run successfully </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Please wait Door unlocking </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; padding: 10px; border: 1px solid black; border-radius: 10px; text-align: center;"> Open door please </div> <div style="flex: 1; text-align: right; padding: 10px;"> Program Start-Stop </div> </div>

4.8 Print-out record

The print-out record contains the following information:

----- MELAG Euroklav 23V-S -----			
Program	Program	Date	Time of start
Program : Universal-program			
134°C wrapped			
Date : 03.04.2000			
Time of day : 13:10:30 (Start)			
Batch number: 3			Running load number for the day
Preheating	110.2 °C	Pre-heating temperature	
Conductivity	14 µS/cm	Conductivity of purified feed water	
Program step	Press.	Temp.	Time
	bar	°C	min
Start	0.00	73.0	00:00
Pre-vacuum			
Evacuation	-0.77	65.2	02:19
Steam entry	0.01	99.0	03:16
1.Fractionation			
Steam entry	1.01	119.9	04:18
Press. release	0.20	104.8	04:49
2.Fractionation			
Steam entry	1.01	120.0	05:52
Press. release	0.19	104.9	06:31
3.Fractionation			
Steam entry	1.00	119.9	07:34
Press. release	0.20	105.0	08:17
4.Fractionation			
Steam entry	1.00	120.0	09:23
Press. release	0.20	105.0	10:08
5.Fractionation			
Steam entry	1.00	119.9	11:13
Press. release	0.20	105.2	12:01
Heat up	2.05	134.0	14:24
Steriliz.begin	2.05	134.0	14:24
Steriliz.end	2.17	136.6	17:54
Pressure release	0.47	118.4	18:36
Current-drying			
Drying begin	0.47	118.4	18:36
Drying current	0.40	105.2	19:02
Drying pumping	1.11	108.1	19:35
Vacuum-drying			
Drying begin	1.11	98.3	28:51
Drying sub atm.	-0.60	88.6	30:13
Drying pumping	0.52	97.9	31:08
Drying end	0.51	95.2	39:19
End	0.12	86.6	39:19

Final report			

PROGRAM PROPERLY EXECUTED!			

Mean sterilization temperature/ deviations			
Mean sterilization pressure / deviations			
Temperature : 136.6 +0.1 /-0.1 °C			
Pressure : 2.17 +0.01/-0.01 bar			
Sterilize time: 3 min 30 s			
Time of day : 13:49:49 (End)			
=====			
12 00000815 3.16 1.13			

Info-line with total number of loads, Works number and software version.			

4.9 Removing the sterilized items

After opening the door the sterilized items can be removed.

Be careful when removing the sterilized items! Touching the metal surfaces can lead to burns. Always use the appropriate aids to lift the trays (MELAG-tray lever, standard tray-lifter) or wear suitable hand protection.

4.10 Sterile storage

After removing wrapped sterile items, the wrapping should be checked for any signs of damage. If it is defective (e.g. split seals) then the sterilization of the items must be repeated after the items have been re-wrapped.

It is important for sterile storage that the items have been properly dried. The Euroklav®23V-S provides very good drying if the program has not been interrupted before its completion and the autoclave has been properly loaded (see Section 4.2). Directly after sterilization there may still be residual condensation on the items or the container. Because the items are hot on removal, this will usually evaporate quickly. The German industrial standard DIN 58953 Part 7 Section 7 contains the following comment about residual moisture on paper wrapping or transparent sterilization paper after sterilization: "...small amounts of water on the wrapping are unproblematic, provided they have evaporated within 30 minutes after removal from the steam sterilizer....."

After cooling, wrapped sterilized objects should be stored in a place where they are **protected from dust** (e.g. instrument cupboard). Given proper storage, DIN 58953 Part 7 gives the following guidelines for the maximum storage periods for sterilized objects: in basic wrapping (e.g. transparent sterilization foil) up to 6 weeks; in double-wrapping up to 6 months.

4.11 Sterilization frequency / pauses

After completing or terminating the drying phase, the autoclave can be reloaded and started immediately. However, continuous operation can lead to increased development of water vapour from the water storage tank. This is not harmful for the Euroklav®23V-S provided there is sufficient space around it for ventilation (10-20 cm) and it is not fully enclosed (e.g. in a cupboard). In order to reduce formation of water vapour it is advisable to have a 20 min pause between loads.

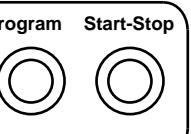
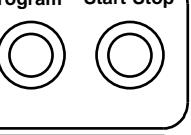
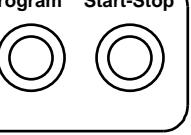
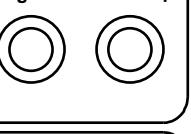
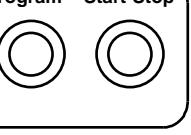
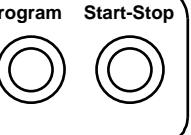
The Euroklav®23V-S should never be installed in an enclosed position, and should always have sufficient space around it.

4.12 Manual termination of program

4.12.1 Termination of sterilization

A program can be terminated after starting of the program step "Drying", e.g. in case of needing an instrument urgently for use. Since the sterilization has been completed, the items are sterilized at this point. Drying is crucial for sterile storage. Depending on when the drying phase was terminated, in particular in the case of wrapped sterile items, insufficient drying must be expected.

Warning! Steam may escape when the autoclave door is opened. If the sterilization phase of the program had not been completed, then it is advisable to carry out an empty sterilization run before reusing the autoclave.

Operation	Display message
1. Press the "Start-Stop" button To confirm, press the "Start-Stop" once again within 5 seconds. If no confirmation is given then the program resumes normally.	 <p>Stop program ? Press STOP</p> <p>Program Start-Stop</p> 
2. If confirmation is given then the program stops. The pressure inside the autoclave will then be equalised, either by pressure release, or by ventilation (if vacuum inside).	 <p>Program stopped</p> <p>Program Start-Stop</p>   <p>Pressure release 1.52 bar 112°C</p> <p>Program Start-Stop</p> 
3. After pressure equalisation, the display will alternately show the messages "Terminated" and an offer to quit the program termination.	 <p>Stop / end 0.02 bar 88°C</p> <p>Program Start-Stop</p>   <p>Acknowledge with button ' - ' </p> <p>Program Start-Stop</p> 
4. To undo the program termination, press the " - " button. - Otherwise, After the message "Please wait, Door unlocking", the display for the selected program reappears.	 <p>Gentle Program 121°C wrapped</p> <p>Program Start-Stop</p> 

4.12.2 Terminate drying

A program can be terminated after starting of the program step "Drying", e.g. in case of needing an instrument urgently for use. Since the sterilization has been completed, the items are sterilized at this point. Drying is crucial for sterile storage. Depending on when the drying phase was terminated, in particular in the case of wrapped sterile items, insufficient drying must be expected. We therefore recommend that you do not interrupt the drying process for wrapped items in the "Universal Program" or "Gentle Program".

With the "Quick Program" it may be desirable to interrupt the drying program so that items can be used again. The unwrapped items will dry as they are cooling down.

Warning! If the drying process is interrupted than steam may be released when the door of the autoclave is opened.

Operation	Display message
1. The autoclave is in the drying phase. The display shows the drying time alternately with the option to terminate the drying phase	 
2. Press the "Start-Stop" button To confirm, press the "Start-Stop" once again within 5 secs. If no confirmation is given then the program resumes normally.	
3. If the "Start-Stop" button has been pressed again to confirm then the program terminates.	
4. After the ventilation of the chamber the display shows that the program has been successfully completed.: alternately with: If a printer is connected and an immediate report has been selected, this is printed-out, together with confirmation that the drying process has been terminated.	  

4.13 Reaction to warnings / error messages

The Euroklav®23V-S has a number of safety features and an extensive integrated control and monitoring system, in order to ensure the greatest possible level of safety for the sterilization process, and to eliminate risks for the patients and operators.

Various aspects of the operation of the appliance, such as pressure and temperature sensors are automatically checked when the autoclave is switched on.

The power supply, and the quantity and quality of the feed water and cooling water are checked before a program can start.

A successful program start is followed in the next stages by the monitoring of all parameters of relevance for the sterilization. If any limit values for the individual program phases are exceeded then there is a malfunction report and the program is automatically interrupted.

In addition to messages, warnings or malfunction reports on the display, if a printer is connected then a printout will provide details of the type of malfunction and when it occurred.

If any such warning message occurs then you should consult Section 7, which provides detailed advice and possible operational errors.

4.14 Operational pauses

In general, the door should only be leant to during operational pauses in order to reduce wear on the door seal and to avoid premature failure or sticking.

In the event of longer breaks, such as during vacations, the cooling water supply should be turned off (and the feed water supply from the water purifier if one is connected).

5 Closing down / Transport / Reinstallation

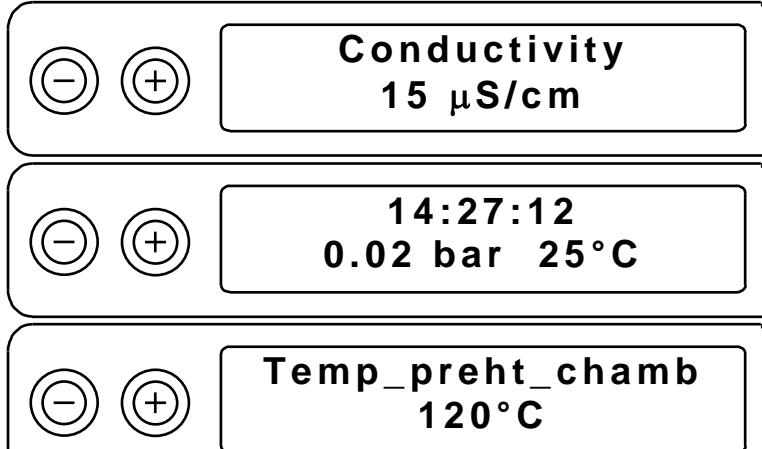
When closing down and transporting the autoclave you should proceed as follows:

- Switch off the power.
- Disconnect from the mains, allow the autoclave to cool down.
- Turn off cooling water and feed water supplies.
- Disconnect pipes at rear of autoclave.
- If transporting the autoclave with trays and tray rack assemblies in place, then protect the inside surface of the door by including a sheet of foam or similar material.
- **Warning! To avoid damage use the original packaging when transporting the autoclave. If the appliance may be exposed to frost in transit then follow the relevant service instructions!**
- When setting the appliance up for reuse after transport or repairs then proceed in accordance with Sections 2 and 3.

6 Special functions

6.1 Water quality (conductivity)/ Chamber preheating temperature

By repeatedly pressing the "-" button, the preheating temperature of the chamber and the conductivity of the purified feed water used for steam generation can be displayed alternately.

Operation	Display message
<p>1. Press down the "-" button to display the conductivity of the feed water $\mu\text{S}/\text{cm}$</p> <p>Release the "-" button to return to the basic display (as shown here) or the program status</p> <p>Press the "-" button repeatedly and hold down: Display shows the pre-heating temperature of the chamber.</p>	 <p>Conductivity 15 $\mu\text{S}/\text{cm}$</p> <p>14:27:12 0.02 bar 25 °C</p> <p>Temp_preht_chamb 120 °C</p>

6.2 Selecting extra drying

The standard drying times for the various programs provide adequate drying if the autoclave has been loaded correctly (see Section 4.2). Nevertheless, with certain loads residual moisture may remain. By selecting the "Extra drying" function, the drying time can be extended by 50%:

Operation	Display message
At the start of the program, press the "+" button. The display shows a message confirming the extra drying, and then the program runs as described in Section 4.7, but with 50 % longer drying time.	 <p>Supplent drying selected</p>

6.3 Records / Load documentation

In order to document the progress of the sterilization program, then the processor memory stores records of the last 40 programs.

These records can be downloaded at a later stage via the serial interface (RS232).

When the memory is full (40 program runs) then before the start of the next run the oldest record will automatically be overwritten. If an external printer is connected (and operable) and the option "Immed. print-out? No" has been selected, then confirmation will be requested before the oldest record is overwritten (see Section 7.3).

Hardware details and the nature of the print-out documentation is provided in the following sub-sections.

6.3.1 Record print-out

6.3.1.1 External printer

6.3.1.2 Connecting the external MELAprint®42 printer

In order to connect a printer to the autoclave then a printer cable should be connected between the 9-pole socket on the front of the autoclave (see page: 4, Fig. 1, Pos. 8) s and the 25-pole on the back of the printer (ensuring a good connection and tightening the locking screws).

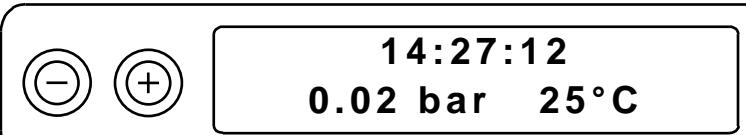
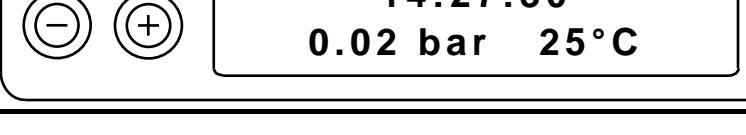
The power supply to the printer is provided by the power unit supplied with the printer, which connects to the socket on the rear of the printer.

The printer is ready for operation when the voltage lamp "P" shines and the status display (Online/Offline) "SEL". The operating manual of the printer includes further details, including the assembly of an external paper feed, inserting paper, and the general operation of the printer.

User Manual Euroklav®23V-S

6.3.1.3 Initializing the printer

After connecting the printer to the autoclave it must be registered with the autoclave processing unit (initialized). Proceed as follows:

Operation	Display message	
1. Switch on autoclave Display shows time, pressure and temperature		Program Start-Stop
2. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"		Program Start-Stop
3. Press "Program" button, Select "Print" menu sub-menu "File transmission"		Program Start-Stop
4. Press "Program" button, Select "File transmission" Display shows current status e.g. "No printer"		Program Start-Stop
5. Press "+" (or "-") button until display shows "External printer"		Program Start-Stop
6. Press "Program" button, Confirm the setting, return to "Print" menu		Program Start-Stop
7. Press "Start-Stop" button, return to the "Function" menu		Program Start-Stop
8. Press "Start-Stop" button, Quit the "Function" menu and return to the initial display		Program Start-Stop

6.3.1.4 Connection to an external PC

6.3.1.5 Installation

Records and archives can also be kept by using an external PC. This requires a suitable connection between the serial port of the PC and the printer port of the autoclave.

For data transfer and data processing then you must first install the program MELAwin® on the PC.

6.3.1.6 Downloading to a PC

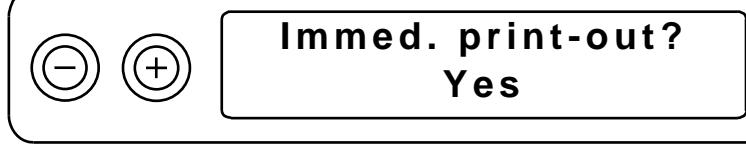
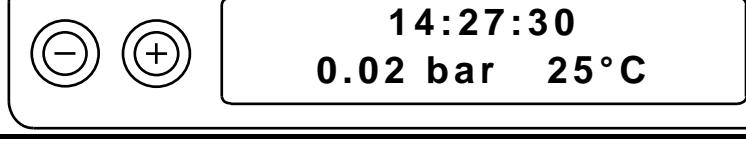
After connecting the autoclave to a PC the print-out option for "External PC" must be selected. Proceed as for an external printer (see Section 6.3.1.3), , but under Point 5 use the "+" or "-" button to select the "External PC" option.

6.3.1.7 No printer

In order to select the option "No printer", proceed as described as in Section 6.3.1.3. Under Point 5, however, use the "+" or "-" button to reach the setting "No printer".

6.3.2 Immed. print-out? Yes/No

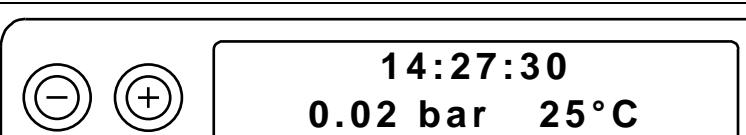
When an external printer is fully installed, a print-out can be produced automatically at the end of each program run by selecting the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) Function: Print Program Start-Stop </div>
2. Press "Program" button, Select "Print" menu sub-menu "File transmission"	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) Print File transmission Program Start-Stop </div>
3. Press "+" button, select sub-menu "Immed. print-out?" Display shows current option, here e.g. "No"	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) Immed. printout No Program Start-Stop </div>
4. The button "Program" can be used to switch between "Yes" and "No" Press "Program" button, Select "Yes" option	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) Immed. print-out? Yes Program Start-Stop </div>
5. Press "Start-Stop" button, Confirm the setting and return to "Function" menu, sub-menu "Print"	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) Function: Print Program Start-Stop </div>
6. Press "Start-Stop" button, Quit the "Function" menu and return to the initial display	 <div style="display: flex; justify-content: space-around; align-items: center;"> (-) (+) 14:27:30 0.02 bar 25°C Program Start-Stop </div>

User Manual Euroklav®23V-S

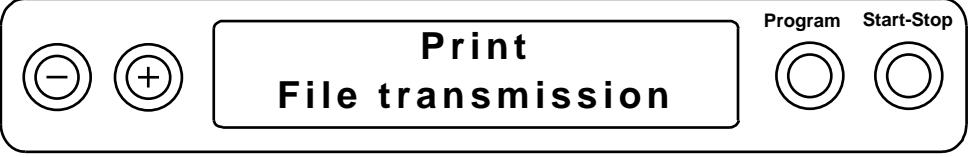
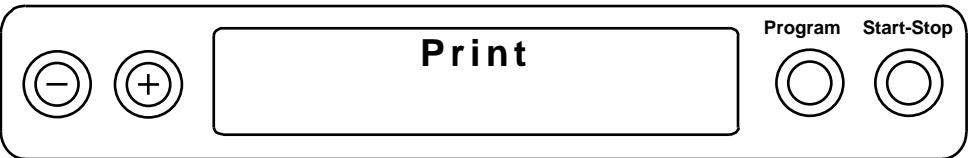
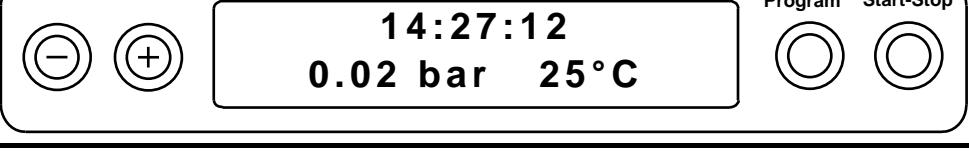
6.3.3 Printing out stored records

When an external printer is fully installed, a print-out of selected records from the memory can be produced by selecting the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the submenu "Last cycle print:" appears on the display	
4. Press "Program" button, the cycle record number flashes	
5. To select another number, press the "-" or "+" button until the right number is reached, e.g. here No. 25	
6. Press "Program" button to start the print-out of the selected record, (or to terminate press "Start-Stop" and return to the "Function" menu)	
7. If you wish to print further records then return to Point 4, or...	
8. ... to terminate press "Start-Stop" and return to the "Function" menu	
9. Press the "Start-Stop" button to return to the initial display	

6.3.4 Print all stored cycle records

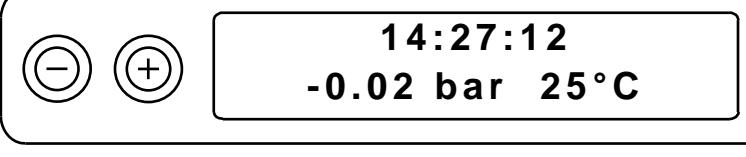
In order to print-out all stored cycle records (with a fully installed external printer) then select the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the submenu "Print stored cycles" appears on the display	
4. Press "Program" button to start the printout of all the stored records (up to 40!), or to terminate press "Start-Stop" and return to the "Function" menu (Once printing has started termination is only possible by switching off the power!)	
5. When the print-out is complete, the display again shows the submenu :	
6. Press the "Start-Stop" button to return to the "Function" menu...	
7. ...and then press "Start-Stop" again to return to the initial display	

User Manual Euroklav®23V-S

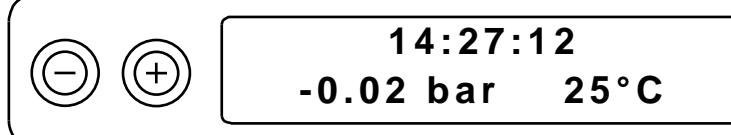
6.3.5 Display printer memory status _____

With a fully installed external printer, the status of the printer memory can be displayed as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	 <p>Function: Print</p> <p>Program Start-Stop</p>
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	 <p>Print File transmission</p> <p>Program Start-Stop</p>
3. Press "+" (or "-") button until the display shows the memory status, e.g.:	 <p>Allocated: 40 Open: 0</p> <p>Program Start-Stop</p>
4. Press the "Start-Stop" to return to the "Function" menu "	 <p>Function: Print</p> <p>Program Start-Stop</p>
5. and press "Start-Stop" again to return to the starting display	 <p>14:27:12 -0.02 bar 25°C</p> <p>Program Start-Stop</p>

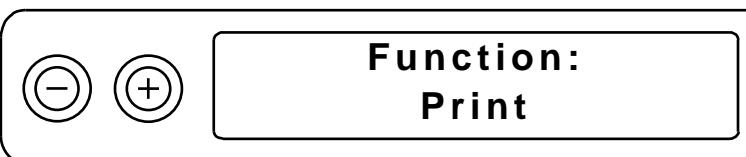
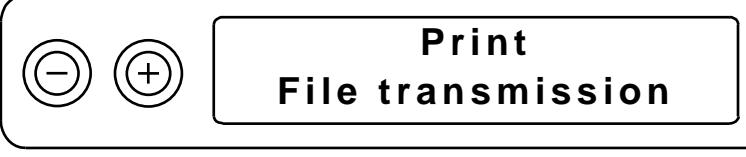
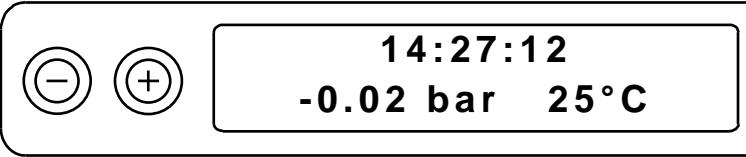
6.3.6 Deleting cycle records

In order to delete cycle records (e.g. in the event of the warning message "Printer memory full", with the option "Immed. print-out? No", selected (see Section 7.3), then after switching on the appliance proceed as follows:

Operation	Display message
1. Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "Data transfer"	
3. Press "+" (or "-") until the display shows "All cycles delete"	
4. Press the "Program" button to delete all records (or press "Start-Stop" to terminate)	
5. Then press "Start-Stop" to return to "Function" menu ...	
6. ...and press "Start-Stop" again to return to the starting point	

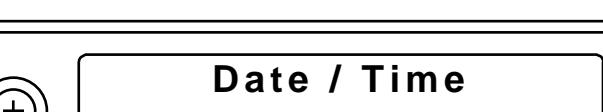
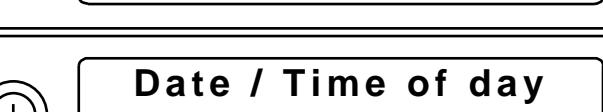
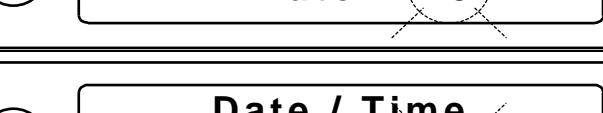
6.3.7 Test print-out

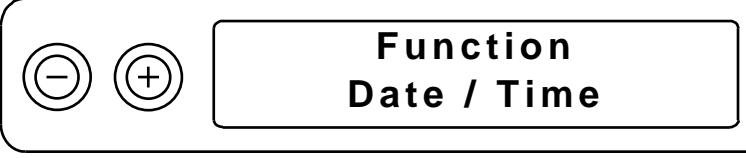
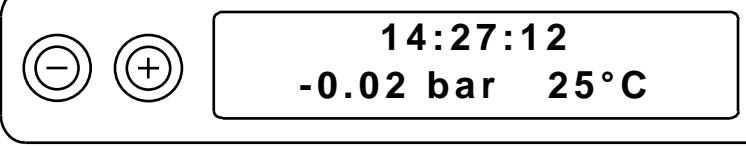
In order to check the printer and its connection to the autoclave, a test print-out can be made as follows:

Operation	Display message
1. Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the display shows "Test printout"	
4. Then press the "Program" button for a test print-out (or press "Start-Stop" to terminate)	
5. Then press "Start-Stop" to return to the "Function" menu	
6. and press "Start-Stop" again to return to the starting position	

6.4 Resetting date and time

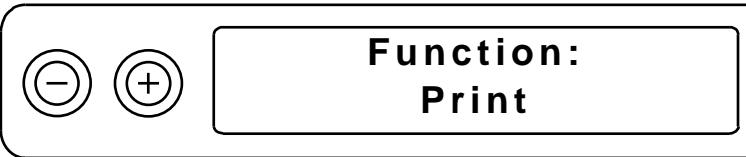
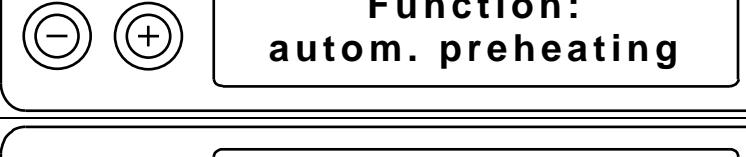
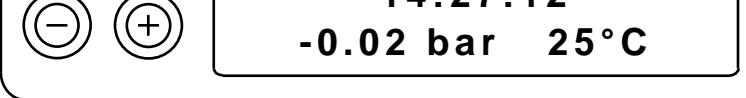
The date and time can be reset if necessary (e.g. winter time/summer time) as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	 <p>Function: Print</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>
2. Press "+" (or "-"), until the display shows the submenu "Date/Time of day".	 <p>Function: Date / Time</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>
3. Press "Program", the display shows the current hour (24-hour clock) (here for example 17.00)	 <p>Date / Time Hour : 17</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>
4. by pressing the "+" (or "-") button the following options can be selected	 <p>Date / Time Minutes : 23</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>  <p>Date / Time Seconds : 13</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>  <p>Date / Time Day : 14</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>  <p>Date / Time Month : 05</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>  <p>Date / Time of day Year : 00</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>
5. After finding the required option, e.g. "Minute", press the "Program" button and the current value flashes	 <p>Date / Time Minute : 23</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>
6. Press "+" or "-" to increase or reduce the value:	 <p>Date / Time Minute : 28</p> <p>(-)</p> <p>(+)</p> <p>Program</p> <p>Start-Stop</p>

Operation	Display message
7. Press "Program" to confirm the new value, which then stops flashing. If more adjustment are necessary, return to Point 4 and begin again,...	
8. ...or press "Start-Stop" to return to the "Function" menu, and	
9. Press "Start-Stop" again to return to the starting point	

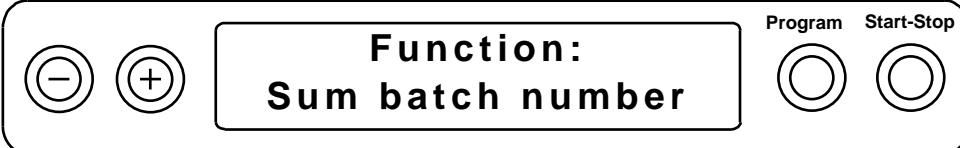
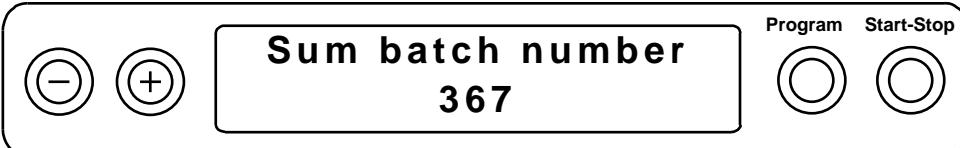
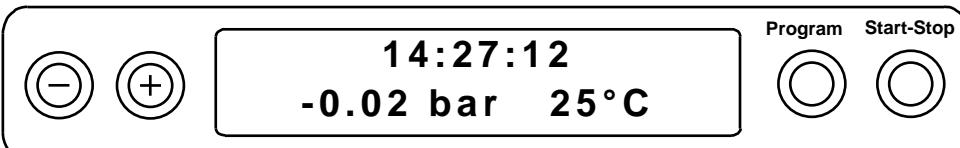
6.5 Automatic preheating

The Euroklav®23V-S has a preheating function by means of which the autoclave chamber can be heated to the necessary temperature before a program starts, or can be maintained at this temperature between cycles. This not only shortens the time for each cycle but also reduces condensation on the walls of the chamber which helps to provide very good drying performance. If the automatic preheating is activated, then this begins as soon as the power is switched on. In the default setting on delivery the automatic preheating is on. The current setting for the automatic preheating can be changed as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	
2. Press "+" (or "-") until the display shows the submenu "autom. Preheating" ..	
3. Press "Program", and the display shows the current option, here "Preheating Yes"	
4. Pressing the "Program" button now alternates between the options "Preheating Yes/No", here e.g. "No"	
5. When the desired option has been selected press "Start-Stop" and return to the "Function" menu, then	
6. ...press "Start-Stop" again to return to the starting point	

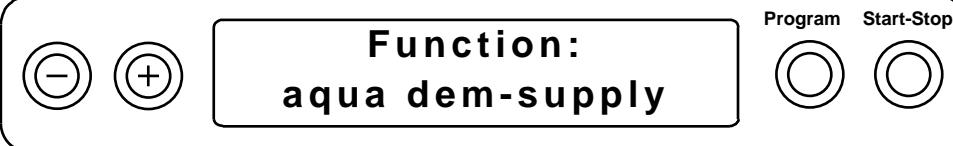
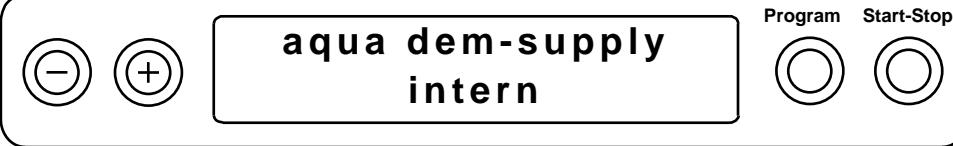
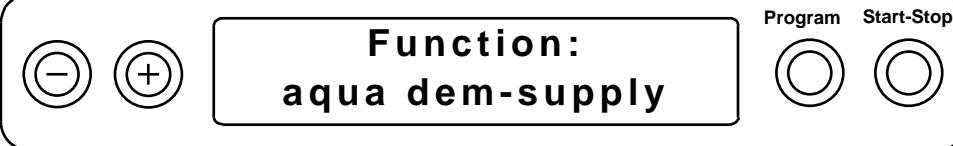
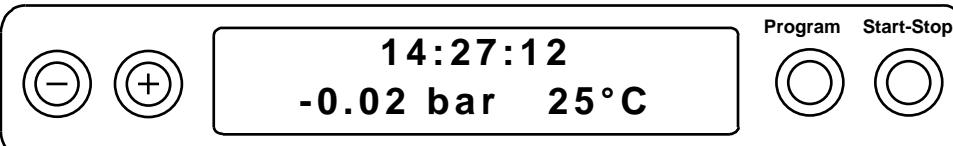
6.6 Total load count

The Euroklav®23V-S keeps a running count of the total number of loads sterilized, and this be displayed as follows:

Operation	Display message
1. Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	
2. Press "+" (or "-") until the display shows the submenu "Sum batch number".	
3. Press "Program", the display shows the current total load count, e.g.:	
4. Close by pressing "Start-Stop", and return to the "Function" menu, then	
5. Press "Start-Stop" again to return to the starting point	

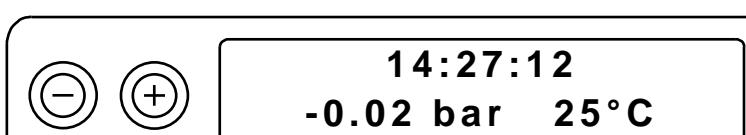
6.7 Distilled / demineralized water supply

The Euroklav®23V-S allows a choice between external and internal distilled / demineralized water, the selection being made as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	
2. Press "+" or "-" button until the display shows the submenu "aqua dem supply".	
3. Press "Program" button, the display will show the current option, here "intern"	
4. Pressing the "Program" button switches between the options "internal" and "extern" (press again to return)	
5. When the correct option has been selected, press the "Start-Stop" button to return to the Function menu and ..	
6. Press the "Start-Stop" button to return to the initial position	

6.8 Water system

The Euroklav®23V-S also allows the choice between closed-loop and one-way system. In the closed-loop system the demineralized or distilled water is reused. In the one-way system the demineralized/distilled water is only used once, which is particularly good for the instruments and the sterilizer, but which leads to increased water consumption (approx. 500 ml). The water system is selected as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Function: Print Program Start-Stop </div>
2. Press "+" or "-" until the display shows the submenu "Water system".	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Function: Water system Program Start-Stop </div>
3. Press "Program" button and the display shows the current option, here "One way"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Water system One way Program Start-Stop </div>
4. Press the "Program" to switch between the option "One way" and "circle" (press again to return)	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Water system circle Program Start-Stop </div>
5. When the desired option has been selected, press the "Start-Stop" button to return to the "Function" menu and	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Function: Water system Program Start-Stop </div>
6. Press the "Start-Stop" button again to return to the initial position	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) 14:27:12 -0.02 bar 25°C Program Start-Stop </div>

6.9 Program modifications

The standard programs are designed to meet most practical operational needs (subatmospheric pulsing, heating, sterilization, pressure release, drying, and ventilation) and to display the parameters of most interest (pressure, temperature, time).

The operator is responsible for ensuring that the autoclave is not overloaded, and that the load is arranged properly to ensure good drying.

There are two standard options "Automatic preheating" and "Additional drying".

Any further program modification to suit specific individual requirements should only be carried out by authorised personnel, after consultation with your dealer or with the experts at MELAG.

7 Operational errors / Malfunctions

7.1 What to do if the autoclave malfunctions

If the autoclave does not seem to be working properly (e.g. poor drying, warnings, or error reports) then follow these instructions in order to exclude possible operational errors. ..Following these instructions continue to work with the autoclave. If the malfunction occurs repeatedly then contact our dealer, and authorised MELAG customer service or contact MELAG directly. You should describe the problem precisely and include the works number of your appliance.

7.2 Malfunctions without display messages

7.2.1 No display

After switching on the autoclave, the display should show the initial setting (see Section 4.1.2).

If there is no display: Check:

Exchange the two power fuses (page 4, Fig. 1, Pos. 9) under the switch as follows: Disconnect the power cable and remove the screw cap over the fuses using a screwdriver or a coin. Exchange the fuses (two reserve fuses are on the inside of the door lining) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG-Art. No. 57590).

1. Is the cable plugged into the mains?
2. Is the mains supply OK?: (if necessary check with another appliance).
3. Exchange the two power fuses (page 4, Fig. 1, Pos. 9) under the switch as follows: Disconnect the power cable and remove the screw cap over the fuses using a screwdriver or a coin. Exchange the fuses (two reserve fuses are on the inside of the door lining) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG-Art. No. 57590).

7.2.2 Excessive water consumption

The consumption of distilled or demineralized water will vary depending on the program and the load in the autoclave. If much more water is consumed than the amount specified in the Annex (see Section 9.2), then you should:

1. Check that the autoclave has been set up correctly, and is higher at the front, so that condensation can flow out at the back (see Section 2.3).
2. Check that the condensation outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
3. If neither of these measures help to reduce water consumption, please inform your specialist dealer.

7.2.3 Poor drying

Good drying depends only on the correct operation of the autoclave, but also on the way the autoclave is loaded. If drying is not satisfactory:

- 1. Check that the autoclave has been set up correctly, and is higher at the front, so that condensate can flow out at the back.
- 2. Check that the condensation outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
- 3. Check that the maximum load has not been exceeded (particularly for textiles), that the autoclave has been loaded properly (no direct contact with the walls of the pressure chamber), and that the appropriate tray-rack assembly has been used (see Section 4.2).
- 4. Activate automatic pre-heating (see Section 6.5).
- 5. Start with "Additional heating" (see Section 6.2).
- 6. If none of these measures help to reduce water consumption, please inform your specialist dealer.

7.3 Warning messages

For the following warning messages, please observe the comments made and restart the program in question. If the warning occurs repeatedly please consult your specialist dealer.

Warning message	Cause / Remedy
WARNING! Door open No start possible Acknowledge with button " - "	<p>Door not closed properly</p> <ul style="list-style-type: none"> Press grip down until contact is made (display should then show "Door closed")!
WARNING! Water supply aqua dem/dest refill ! No start possible Acknowledge with button " - "	<ul style="list-style-type: none"> This message appears when the supply of demineralized/distilled water is set to "internal", so that water is supplied from the internal tank If the water level in the storage tank (right chamber) falls below the minimum mark the signal will be triggered <ul style="list-style-type: none"> Check the level of water in the tank, and refill to max. with distilled or demineralized water of the appropriate quality
Warning Water supply Check supply aqua dem/dest No start possible Acknowledge with button " - "	<ul style="list-style-type: none"> This warning appears when the supply of demineralized/distilled water is set to "external". IN this case the water will be supplied from an external water purifier. The internal flow monitor for the demineralized/distilled water supply has not reacted (when filling the steam generator): Supply from MELAdem®47: <ul style="list-style-type: none"> Check the water purifier. If necessary open the water intake tap. If the pressure water storage unit is empty wait approximately 1 hour before restarting the program. If the message reappears repeatedly, have the water purifier serviced. Supply from MELAdem®37: <ul style="list-style-type: none"> Check the water purification system. If necessary open the water intake tap. If the message reappears repeatedly, have the water purifier serviced <p>If the autoclave is being used for the first time or is being restarted after a break then this message may simply be caused by the fact that the tubes were initially empty - just repeat the start procedure..</p>

Warning message	Cause / Remedy
WARNING! Wastewater tank discharge No start possible Acknowledge with button " - "	<ul style="list-style-type: none"> This warning appears if the wastewater tank (left tank) is full. The warning is generated when the water reaches the maximum level in the container. Empty the tank as follows: <ul style="list-style-type: none"> Pull on the left plug on the front of the autoclave and withdraw the emptying pipe as far as possible. Hold the end of the pipe over a container (min. capacity 5 litre) standing on the floor. pull the stopper out of the pipe and allow the water to drain out. When all the water has drained away, replace the stopper in the pipe, and push the pipe back into the opening on the front of the autoclave. The message can then be acknowledged.
Water quality bad Exchange module/cartridge	<p>Conductivity of the demineralized or distilled water is above the first limit value, a start is possible by pressing the "Start" button once more:</p> <ul style="list-style-type: none"> For the one-way option <ul style="list-style-type: none"> Empty water from storage container (right chamber), clean tank with distilled/demineralized water and refill to max. with purified water to specifications For the closed-loop option <ul style="list-style-type: none"> Empty water from both chambers of the internal storage tank, clean tank with distilled/demineralized water and refill to max. with purified water to specifications. Water from the MELAdem®47: The demineralization cartridge in the ion exchanger may be exhausted. Exchange in accordance with the operating manual. Water from the MELAdem®37: The demineralization unit may be exhausted. Exchange in accordance with the operating manual. Water from other purification equipment: Exchange the demineralization / deionisation unit in accordance with the manufacturer's instructions. <p>After taking the appropriate steps, carry out the program start. When starting for the first time after exchanging the purified water container, or after maintenance of the water purification equipment, there may be another report because at first the supply tube and /or measuring cell will not have been washed out with fresh, pure water.</p>
Water quality insufficient No start possible Acknowledge with button " - "	<p>Conductivity of the demineralized or distilled water exceeds the second limit value - a program start is no longer possible: Proceed as above for "Water quality poor".</p>

Warning message	Cause / Remedy
WARNING!	<p>The pressure for the ventilation drying lies outside the permitted range. The report comes at the end of the program, and as the last line of the print-out:</p> <ul style="list-style-type: none"> The sterile filter may be clogged or torn. Exchange the sterile filter (MELAG Art. No.: 53390).
Sterile filter Replace ! Acknowledge with button " - "	
Printer is Not ready	<p>Communication with the printer via the serial interface has been interrupted. This message appears when a report cannot be printed out. It is displayed for 20 seconds. If the printer becomes operational during this period the cycle record prints out:</p> <ul style="list-style-type: none"> The autoclave may be operated without a printer. Check under the "Data transfer" menu that the option "No printer" has been selected. (see Section 6.3.1.7) Check the cable connection between the printer and the autoclave. Check the power supply to the printer. In the MELAprint®42 the red light should indicate 'power on' The printer may be "Offline". Select "online" (MELAprint®42, press "SEL" button, green LED "SEL" should shine)
Printer memory full	<p>The internal printer memory is full (40 cycles recorded), an external printer is registered, and in the "Print" menu the option "Immed. print-out? No" is selected. The message is displayed when a program is started. Pressing the "Start / Stop" button again deleted the message and the program starts:</p> <ul style="list-style-type: none"> You can continue operations simply by pressing the "Start / Stop" button twice when you start a program. Select "Immed. print-out? Yes" (see Section 6.3.1.7) Delete stored records (See Section 6.3.6), if necessary print-out all stored cycle records first (see Section 6.3.4) <p>In the Data transfer menu, select the "No printer" option (see Section 6.3.1.7)</p>
Execute service please	<p>The service message is activated after a certain number of loads, when a service is due. The message appears before the start of every program. If you press the "Start / Stop" button again the message is deleted and the program starts.</p> <ul style="list-style-type: none"> You can continue operations, by simply pressing the "Start / Stop" button twice when you start a program. Have a service carried out as recommended by an authorised MELAG servicing company or your specialist dealer. <p>The cycle counter for servicing should be reset after the service.</p>

Test unsuccessful Leak rate: 3.8	The leak rate during the vacuum test exceeds the limit value: <ul style="list-style-type: none">Check and if necessary clean the door seal and the rim of the chamberRepeat the vacuum test with a completely cold autoclave If no other error reports occur during operation, you can continue to use the autoclave until the regular service, when the cause of the leak will be identified.
WARNING! Battery dead	<ul style="list-style-type: none">The monitoring of the internal device battery voltage has determined a too low voltage value. The battery has to be changed by the MELAG service-company/ service.

7.4 Error reports

Errors are generally reported by an "Error" on the display with the number of the error and its short name. Error reports may occur without a program start (when the power is switched on or soon after), or during a program.

If errors are reported during a program, then in addition to the error report the program will also be stopped. This may be accompanied by the equalisation of the pressure in the autoclave, and in this case the error message will alternate with the messages "Pressure release", or "Ventilation", and "End".

After the termination, the display will alternately show the error message and "Quit with "-" button" and then "Terminate End ". Pressing "-" deleted the error message (if the error is not permanent). Until you have quit the error message the autoclave door cannot be opened. If a program has been prematurely terminated in this way the autoclave load must always be regarded as being **not sterilized**. We recommend that you unload the autoclave, carry out a sterilization cycle without any load (the drying may be impaired for this first cycle) and then reload the autoclave and repeat the interrupted operation cycle.

If an external printer is connected and "Immed. print-out? Yes" is selected, a record will automatically be printed out at the end of the termination.

The print-out shows the full name of the error, and if a program has been interrupted before completion it will also show "Load not sterile". The following list gives error reports, the cause and possible remedies.

Error report	Cause / remedy
Malfunction 1: Vacuum system	<p>The monitoring time for reaching the evacuation pressure for the individual pressure cycles, pressure release, or for reaching the minimum drying pressure has been exceeded:</p> <ul style="list-style-type: none"> Check that the door seal and the lip of the opening to the pressure chamber are intact and clean. Check that the autoclave is standing properly (see Section 2.3). Check that the outflow of condensate is not obstructed by fallen instruments, pieces of filter paper, etc. on the floor of the pressure chamber. Check that the flow filter is not blocked (at the front of the base of pressure chamber)! Check for leaks using the "Vacuum test" program. If this occurs repeatedly, inform your specialist dealer.
Malfunction 2: Steam generator	<p>The monitored time was exceeded not only for the heating-up phases during air removal by sub-atmospheric pulsing, but also for achieving the required sterilization pressure. Causes of this error may be any of the following:</p> <ul style="list-style-type: none"> Maximum loading amounts were exceeded. Reduced heating output, since the mains voltage was too low. Please check the electrical power supply from the building. Try to see if the device works properly when connected to another electrical circuit. Loss of water as a result of leaks, or from formation or collection of water Do not allow water to collect in the objects to be sterilized: be sure to turn bowls, cups, glasses, and the like <u>upside down</u> so that their openings are downward. Cassettes perforated on one side must be turned so that their perforated side faces downward. Important: It is not allowed to use cassettes that are completely closed. Important: It is not allowed to sterilize without using tray racks. After the above possible causes have been eliminated,  press the reset button on the device. Symbol:  Important: After pressing the reset button, perform an empty sterilization cycle in the "Fast" program (sterilization with completely empty sterilization chamber). <p>If the problem continues, notify your specialist MELAG dealer</p>

Error report	Cause / remedy
Malfunction 4: Pressure release	<p>The monitoring time for the ventilation of the pressure chamber was exceeded.:</p> <ul style="list-style-type: none"> Check that the pressure releases at the rear of the chamber are not blocked If this occurs repeatedly, inform your specialist dealer.
Malfunction 8: Timebase	<p>Maximum difference between the program duration and the internal clock exceeded: If this occurs repeatedly, inform your specialist dealer.</p>
Malfunction 9: Door open	<p>Door not closed properly</p> <ul style="list-style-type: none"> Press grip down until contact is made (display should then show "Door closed")! If this occurs repeatedly, inform your specialist dealer.

Malfunction 10: Steamgen. too hot	<p>The capillary tube level regulator is open at the start of the program (error report immediately after start), or the monitoring time until refilling with demineralised or distilled water during the program (until the end of sterilization) is exceeded:</p> <ul style="list-style-type: none"> • This problem can arise because after stopping a program and immediately restarting - wait for two minutes and try starting again. <p>If this occurs repeatedly, inform your specialist dealer.</p>
Malfunction 12: Door lock	<p>Maximum permissible time for door locking: Check the locking bolt can move freely</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 14: Water supply	<p>The flow monitor for the demineralized / distilled water supply does not close during the program (see message "Warning no feed water" - page 34).</p>
Malfunction 18: Sens defect Nr.	<p>The internal testing of the sensors for temperature, pressure or conductivity showed an excessive deviation, the error can be reported on switching on the appliance or in the course of a program:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 21: Preheating	<p>The pre-heating has not reached the necessary temperature within the specified time limit: If this occurs repeatedly select the option "Automatic preheating No" and inform your specialist dealer (see Section 6.5).</p>
Malfunction 22: Overheating	<p>The maximum preheating temperature was exceeded:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly start the autoclave without preheating and inform your specialist dealer.
Malfunction 23: Current	<p>The monitoring time for the pressure release in the outflow process for the fractionation was exceeded:</p> <ul style="list-style-type: none"> • Check that the flow filter at the bottom of the chamber close to the door is not blocked ▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 26: A/D-Converting	<p>The limit deviation for internal analog/digital signal conversion has been exceeded:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 27: Temp. sens. def 1,2	<p>The limit deviation between the two sensors for the steam temperature has been exceeded: If this occurs repeatedly, inform your specialist dealer.</p>

Error report	Cause / remedy
Malfunction 31: System leak	<p>During the Vacuum test program the pressure was too high (very large leak): Repeat the vacuum test, and if there is another error report inform your specialist dealer</p>
Malfunction 32: Power failure	<p>After starting the program there was a loss of power. The error report is received when the electricity supply is restored:</p> <ul style="list-style-type: none"> • Check the mains power supply installation, if no errors can be found, inform the service agent.
Sterile filter sterilize	<p>If there is a loss of power when the chamber is under pressure, then there will be an additional reminder to sterilize the sterile filter, since this may have become moist and non-sterile:</p> <ul style="list-style-type: none"> ▪ Remove the sterile filter at the rear of the autoclave.

	<ul style="list-style-type: none">▪ Sterilize the filter using the rapid program.▪ Then replace the filter.
Malfunction 33: Pressure drop	The time limit for the steam generator to reach the necessary pressure has been exceeded: <ul style="list-style-type: none">• If this occurs repeatedly, inform your specialist dealer.
Malfunction 34: Sterilization TU	The minimum sterilization temperature has not been reached: <ul style="list-style-type: none">▪ Reduce the size of the load.▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 35: Sterilization TO	The maximum sterilization temperature has been exceeded: <ul style="list-style-type: none">▪ If this occurs repeatedly, inform your specialist dealer
Malfunction 36: Sterilization PU	Sterilization pressure falls below the minimum level: <ul style="list-style-type: none">▪ Reduce the size of the load.▪ If this occurs repeatedly, inform your specialist dealer
Malfunction 37: Sterilization PO	The maximum sterilization pressure has been exceeded: <ul style="list-style-type: none">▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 38: Sterilization TD	The difference between measured and theoretical temperature is too large: <ul style="list-style-type: none">• If this occurs repeatedly, inform your specialist dealer.
Malfunction 41: Current drying	The monitoring period for the pressure release in the flow release during drying was exceeded: <ul style="list-style-type: none">• Check that the flow filter at the bottom of the chamber close to the door is not blocked▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 42: Drying press.-pump	The monitoring time for the pressure increase during pressure drying was exceeded: <ul style="list-style-type: none">• Check that the sterile filter is not blocked, if necessary replace▪ If this occurs repeatedly, inform your specialist dealer.
Malfunction 43: Drying Vac.-pump	The monitoring time for vacuum generation during vacuum drying was exceeded: <ul style="list-style-type: none">• Check that the flow filter in the chamber directly behind the door is not blocked <p>If this occurs repeatedly, inform your specialist dealer.</p>

8 Taking care of your autoclave

8.1 Preparation of instruments

MELAG - rust-free materials

All parts of the Euroklav®23V-S which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust

The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).

Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization

The example of the formation of film rust shows how important it is to prepare items properly before sterilization.

Handpieces and contra-angles must be cleaned before sterilization and maintained (e.g. by oiling). Other instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103, or similarly strict national codes of practice in a disinfectant and/or cleaning solution at the correct concentration for the correct length of time

MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment for handpieces for contra-angles, as well as thermo-disinfecting devices.

It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. Turbines and handpieces must be oiled in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments

The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.

Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

8.2 Rust formation = Drag-in rust

As already explained, the non-rusting materials used in the autoclave cannot cause rust formation in the autoclave!

Where rust forms this is "drag-in rust". This originates from instruments or other metal items carrying traces of rust, even though they are made of stainless steel, or which are made of normal steel but which have a damaged galvanic coating. Often, a single rusty instrument is enough to pass rust on to other instruments or to lead to film rust forming in the autoclave resulting to corrosion damage. Drag-in rust must be removed from the affected instruments or from the autoclave and tray assembly using a mild commercial cleaning agent for stainless steel. (This should not contain of chlorine).. Do not use steel wool, a wire brush or other abrasive cleaners! Spots can be removed with a damp, lint-free cloth or a cloth with surgical spirits or alcohol.

8.3 Taking care of the Euroklav®23V-S

8.3.1 Cleaning

The tray assembly and the autoclave chamber including the contact area of the door gasket and the door opening should be inspected thoroughly at least once a week for signs of damage or soiling. If necessary, wipe out the autoclave chamber using a **lint-free cloth** and surgical spirits. This involves withdrawing the trays and tray guide assembly. Stubborn spots can be removed using small amounts of a mild commercial steel cleaning agent (pH-levels from 5 to 8). Care must be taken to ensure that cleaning agent does not get into the pipes attached to the autoclave chamber. The cleaning agent must not contain chlorine and should not be alkaline. Do not use abrasive cleaning pads, steel wool, or brushes.

Inspect the door seal every week for signs of damage and soiling, and if necessary clean it with a mild commercial liquid cleaning agent (pH-levels from 5 to 8) or with surgical spirits. If necessary, the seal can be removed.

The bolt of the door lock (right side) and the door hinge (left side) must be regularly lubricated with silicone grease (MELAG Art.No. 24355), in order to ensure that the door can easily be locked and unlocked, without unnecessary wear.

The outer parts of the autoclave can be cleaned with a mild commercial cleaning agent or with surgical spirits. If water is supplied from and returned to the internal tank, then this should be inspected before refilling with distilled / demineralized water. Whenever necessary it should be cleaned. The wastewater tank on the left should be emptied at least every two weeks and washed out with clear mains-supply water. Hard stains and oily residues may have to be removed using a little washing-up liquid and warm mains-supply water with a suitable soft brush, followed by swilling with distilled / demineralized water. Should the right tank need cleaning after a lengthy period of close-loop operation then this should be cleaned in the same way, and also thoroughly swilled.

8.3.2 Use of demineralized or distilled water

Quality requirements

For steam sterilization it is necessary to use high quality distilled or demineralized water.

The water used should at least comply with the specifications in accordance with European-standard EN 13060 listed in the table below.

For the operation of the Euroklav®23V-S, however, **battery water in accordance with VDE 510** is sufficient, as long as the VDE specifications are strictly adhered to (conductivity on production $\leq 10 \mu\text{S}/\text{cm}^*$, when used $\leq 30 \mu\text{S}/\text{cm}^*$, pH-value identical with EN 13060, evaporation residues analogous).

Where to purchase the water

Battery water in accordance VDE 510 is widely available in large drug stores, supermarkets and do-it-yourself stores at low prices. The necessary purity standards must be expressly detailed on the label, because with insufficiently pure water calcium scaling could form in the steam lines and valves, restricting the operation of the autoclave. Aggressive water (pH < 5 or > 7.5) can also lead to damage in the autoclave.

Formation of spots on instruments

The extent to which spots form on the instruments depends on the quality of the water used to produce the steam.

Specifications for water quality in accordance with the EN 13060

Evaporation residue	$\leq 10 \text{ mg/l}$
Silicon oxide, SiO_2	$\leq 1 \text{ mg/l}$
Iron	$\leq 0.2 \text{ mg/l}$
Cadmium	$\leq 0.005 \text{ mg/l}$
Lead	$\leq 0.05 \text{ mg/l}$
Other heavy metals	$\leq 0.1 \text{ mg/l}$
Chlorides (Cl)	$\leq 2 \text{ mg/l}$
Phosphates (P_2O_5)	$\leq 0.5 \text{ mg/l}$
Conductivity at 20°C	$\leq 15 \mu\text{S}/\text{cm}^*$
pH (degree of acidity)	5 - 7.5
Appearance	Colourless; clean; without sediment
Hardness (Σ of ions of alkaline earth)	$\leq 0.02 \text{ mmol/l}$

^{*}) $\mu\text{S}/\text{cm}$ = micro-Siemens per centimetre

8.4 Checking the operation of the autoclave

8.4.1 Safety with automatic monitoring

The electronic parameter control means that all relevant parameters are constantly monitored and compared with standard process data, so that error reports can be made immediately. If a program is completed without problems then on its completion there is an "End" message. The print-out contains a corresponding report.

The operator of the autoclave can check the progress of the program at any time by means of the values shown on the display (or after its completion by means of the print-out).

8.4.2 Periodical bacteriological testing (twice a year)

The German industrial standard DIN 58 946 Part 8 Section 3.2 recommends:

"Periodical testing shall be carried out at the place of installation, e.g. at 6 monthly intervals. They shall demonstrate that sterilization is carried out satisfactorily when the operating instruction for the small sterilizer are followed."

Hygiene institutes and regional medical test centres can supply test spores on request and document the results of sterilization on a test form.

8.4.3 Maintenance recommendations

Regular maintenance of the autoclave is important if it is to have a long life and remain in good working order.

MELAG recommends that the Euroklav®23V-S be serviced annually by a trained technician in accordance with maintenance instructions for this autoclave. The annual service includes a visual inspection and a test of operational functions. As well as all essential components and electrical elements, parts are also inspected for wear and replaced as necessary.

A maintenance reminder appears on the display after 1000 sterilizations.

Consult your dealer of the MELAG Customer Service if you have any questions relating to servicing and maintenance.

9 Annex

9.1 Installation options

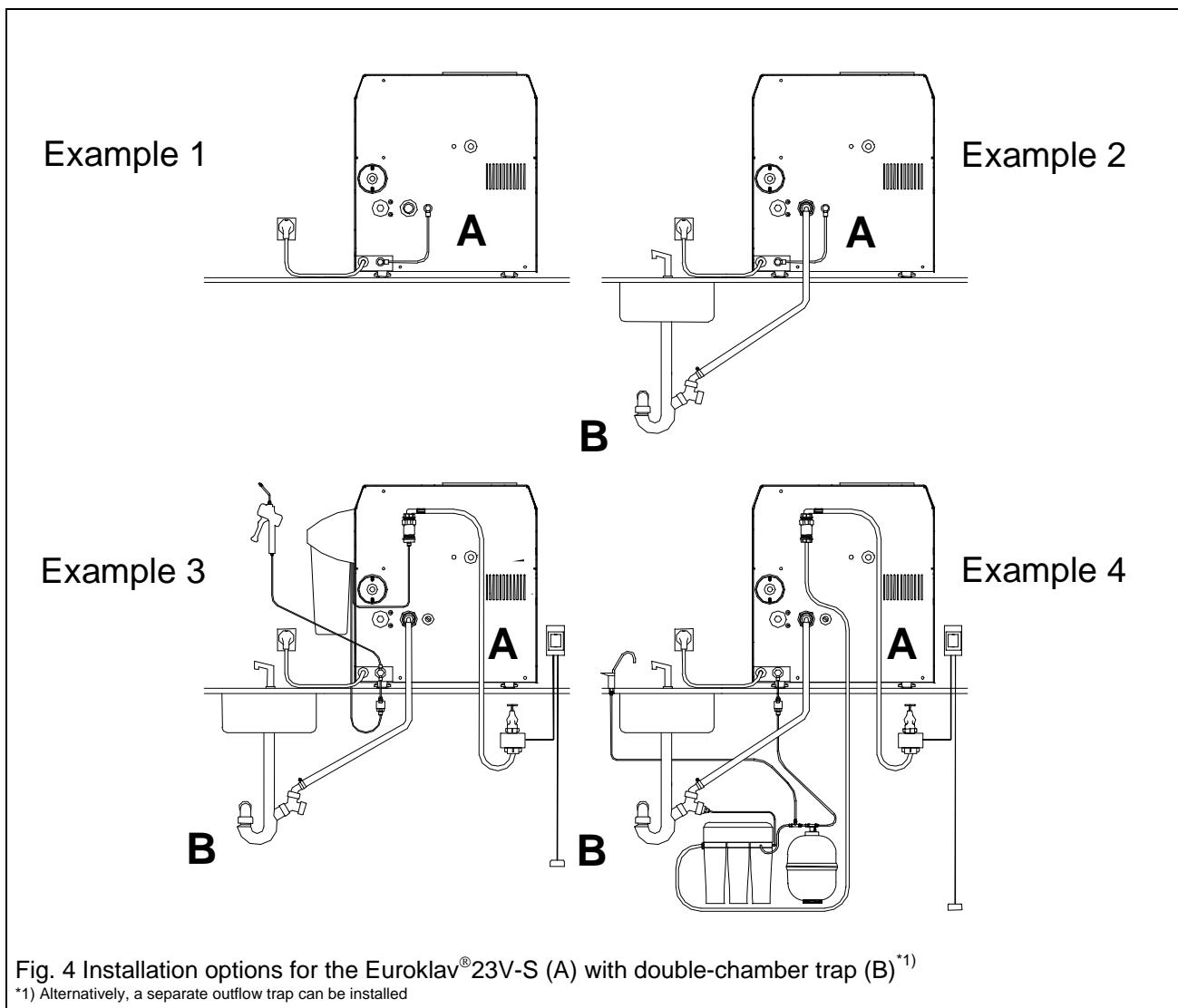


Fig. 4 Installation options for the Euroklav®23V-S (A) with double-chamber trap (B)^{*1}

^{*1}) Alternatively, a separate outflow trap can be installed

Example 1

Euroklav®23V-S (rear view), basic version
Water supply be means of internal double chamber storage tank

Example 3 EN1717

Euroklav®23V-S (rear view) with installed MELAdem®40 and MELAjet®
Double chamber trap
Leak detector with stop valve (optional)
MELAdem®40
MELAjet® (optional)

Example 2

Euroklav®23V-S (rear view) with one-way water outflow installed Double chamber trap

Example 4 EN1717

Euroklav®23V-S (rear view) with installed MELAdem®47
Double chamber trap
Leak detector with stop valve (optional)
MELAdem®47

9.2 Additional technical data

9.2.1 Capacity / Weight

Weight (unloaded)	43 kg
Chamber volume	22 litre
Maximum load	4 kg instruments or 1 kg textiles
Loading options:	Mount "B" with max. 4 standard tray-cassettes or 4 MELAG-trays Mount "C" with max. 6 standard tray-cassettes or 3 MELAG-trays MELAG- Sterilization containers: 28MG, 23R,M,G, 15K,M,G, 17K,M,G,R, Foil holder

9.2.2 External supplies

Electric power supply	
Mains supply	230 V AC, 10.4 A, 50...60 Hz
Rating	3000 W; 16 A fuses, circuit breaker 30 mA
Distilled / demineralized water	Distilled or demineralized water in accordance VDE 0510

9.2.3 Operational parameters

9.2.3.1 Programs / Operation times

Program	Operation time (without drying) *:		Drying time:
	Warm start/ low load	Warm/ max. load	
"Quick program" (unwrapped) (134°C, 2bar)	12 min	13 min	13 - 15 min
"Universal program" (wrapped) (134°C, 2bar)	19 min	22 min	22 - 26 min
"Gentle program" (121°C, 1bar)	31 min	35 min	27 - 30 min
"Prion Program" (134°C, 2bar)	36 min	39 min	22 – 26 min
"Bowie&Dick" (134°C, 2bar)	21 min	22 min	4 min
"Vacuumtest"		18 min	

9.2.3.2 Energy / Water consumption *

"Pre-heating"	
Warming up to pre-heating temperature (134°C)	ca. 0.14 kWh (= x € ¹⁾)
"Stand by" mode/ hour	ca. 0,22 kWh (= x € ¹⁾)
Program run (including drying):	0.33 kWh (= x € ¹⁾) for "Quick Program", warm start, low load, to 1.3 kWh (= x € ¹⁾) for "Gentle program", cold start, full load
Consumption of distilled / demineralized water	450 ml (= 4,5 cent ²⁾) for "Quick program", 600 ml (= 6 cent ²⁾) for "Universal program" or "Prion-program" 650 ml (= 6,5 cent ²⁾) for "Gentle program"

*) These values are valid for a constant power supply of 230 V.

1) x = energy consumption in kWh x price for one kWh in €/kWh

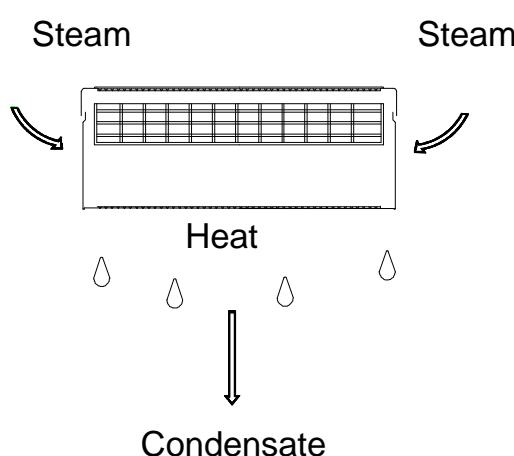
2) Based on a price of € 0.10 per litre distilled water from the MELAdest 65

9.3 Instructions on drying

The Euroklav®23V-S provides very good drying standards for sterilized items. Particularly difficult drying tasks (e.g. double wrapping) can also be dried to very good standards with the help of the supplementary drying function and the automatic pre-heating (see Sections 6.2, 6.5). Please read the following sections, which may help you to optimise your drying results.

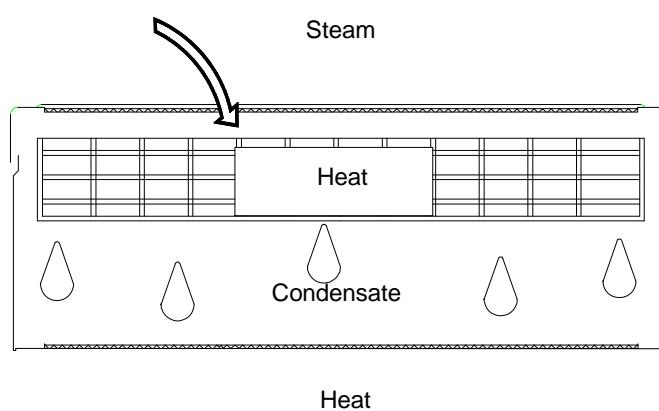
9.3.1 Drying in sterilization containers

In the autoclave steam is produced by heating water. The steam transfers heat to the instruments and sterilization container and warms these. This leads to steam condensing on the instruments and containers.



Formation of condensation on the sterilization container

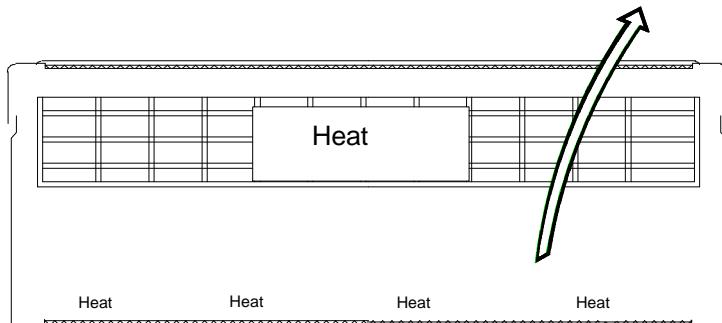
The steam also heats the objects contained in the sterilization containers. Condensation forms on the objects being sterilized, and some of the condensation drops to the bottom of the sterilization container.



Formation of condensation on sterilized objects

After sterilization, during the drying phase, all the condensation must evaporate from the sterilization container and from the sterilized items themselves. This is achieved by the transfer to the condensate of heat stored in the walls of the sterilization container and in the sterilized items themselves. It is preferable that the sterilization container be made of aluminium, as this metal stores and conducts heat well, ensuring faster drying than other materials.

Condensate+Heat=Steam

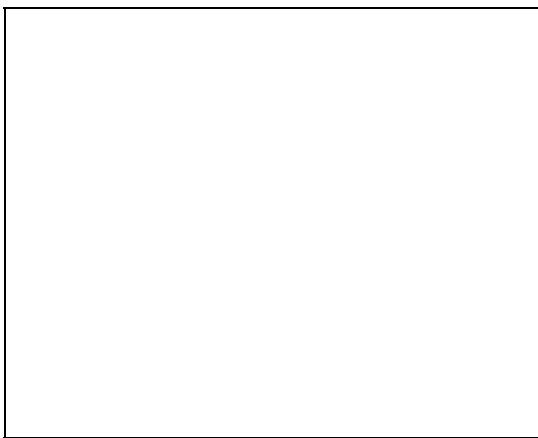


Drying

For good drying it is essential that surplus heat be transferred to the objects which have been sterilized. In addition, the condensation must be led out of the sterilization containers. The floor of the containers have channels and the lid has an arched filter area.

9.3.2 Textiles

When preparing textiles for treatment in the autoclave, care must be taken that the folds in the textiles are arranged in parallel, and that the items are packed side-by-side. This vertical configuration ensures that channels can form between the textile folds for the air to flow out and steam to flow in. Do not stack textiles on top of each other as this hinders the penetration of steam into the packages of textiles.



Loading textiles properly

When loading sterilization containers with textile items, care should be taken to ensure that they retain their vertical orientation, but that the items are not squashed together. This would prevent the formation of flow channels for air and steam. If the packages of textiles cannot be kept upright, then it might be advisable to wrap them in sterilization paper.

The textiles must not touch the sides or the base of the sterilization container, since they might become saturated with condensate.

For good drying results, the textiles should also be as dry as possible when they are placed in the autoclave. The heat stored in the chamber and sterilization container may not otherwise be sufficient to evaporate both the moisture and the condensation.

9.3.3 Instruments

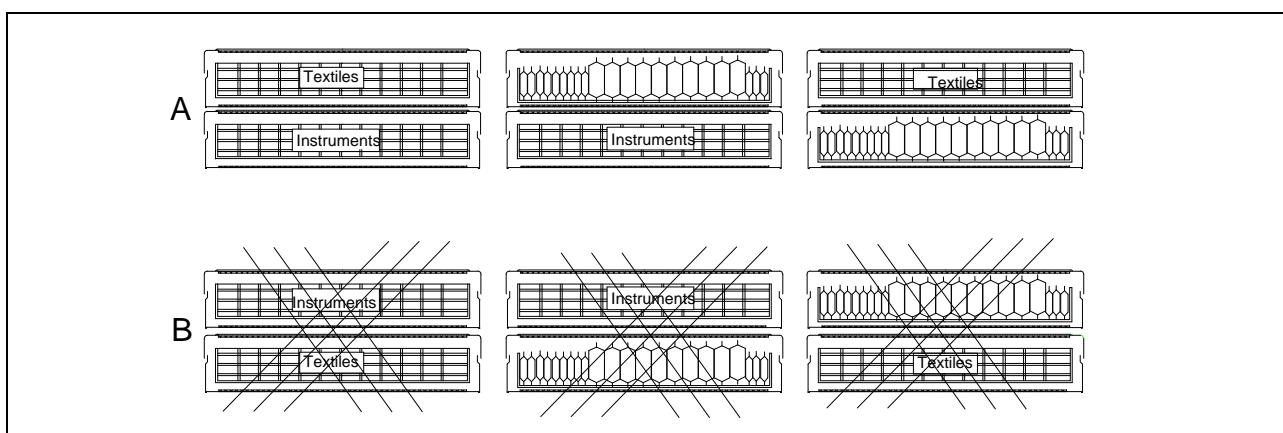
Where appropriate, instruments should be disassembled before placing them in the autoclave, as this will improve the drying results.

The use of lubricants (such as instrument oil) should be avoided unless absolutely necessary. Prior confirmation should be obtained from the manufacturer of such agents that they are in fact suitable for steam sterilization. Substances which are hydrophobic or impenetrable for steam can not only lead to poor drying results, but may also mean that the steam sterilization is unsuccessful, since not only the instruments are protected but also micro-organisms..

9.3.4 Loading the autoclave

Textiles and instruments should not be sterilized together in one sterilization container. Textiles and instruments in separate sterilization containers should as far as possible not be sterilized in the same load. However, where this is unavoidable for economic or other reasons, the following rules should be observed:

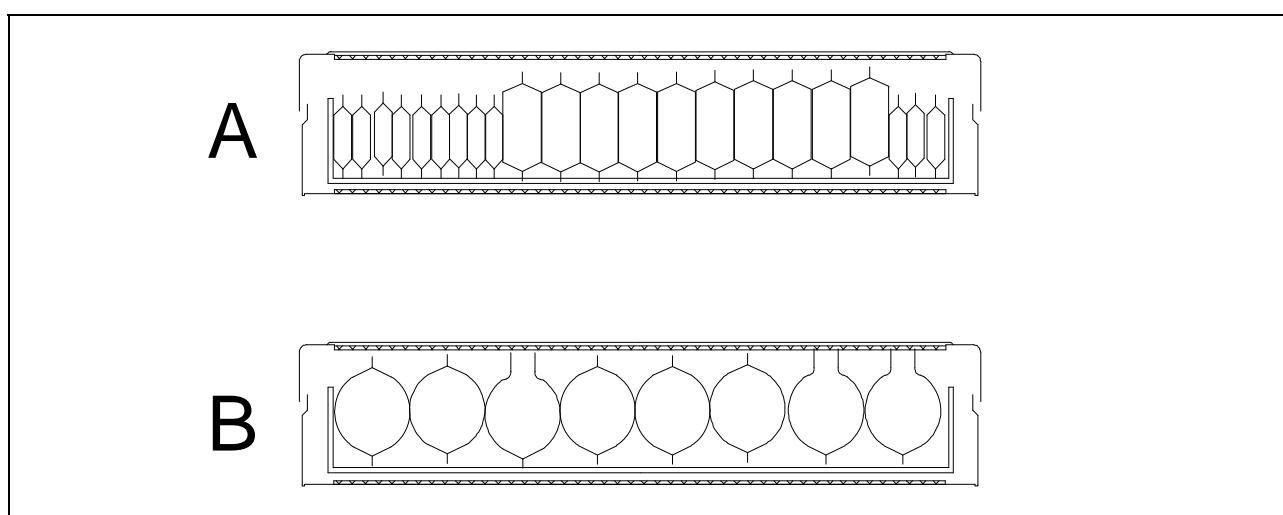
- Instruments and sterilization containers should be placed at the bottom
- Textiles should always be placed at the top
- Transparent sterilization packages and paper sterilization packages should be placed at the top (except when in combination with textiles, in which case they must be at the bottom).



Loading the autoclave

9.3.5 Loading containers with soft sterilization packing material

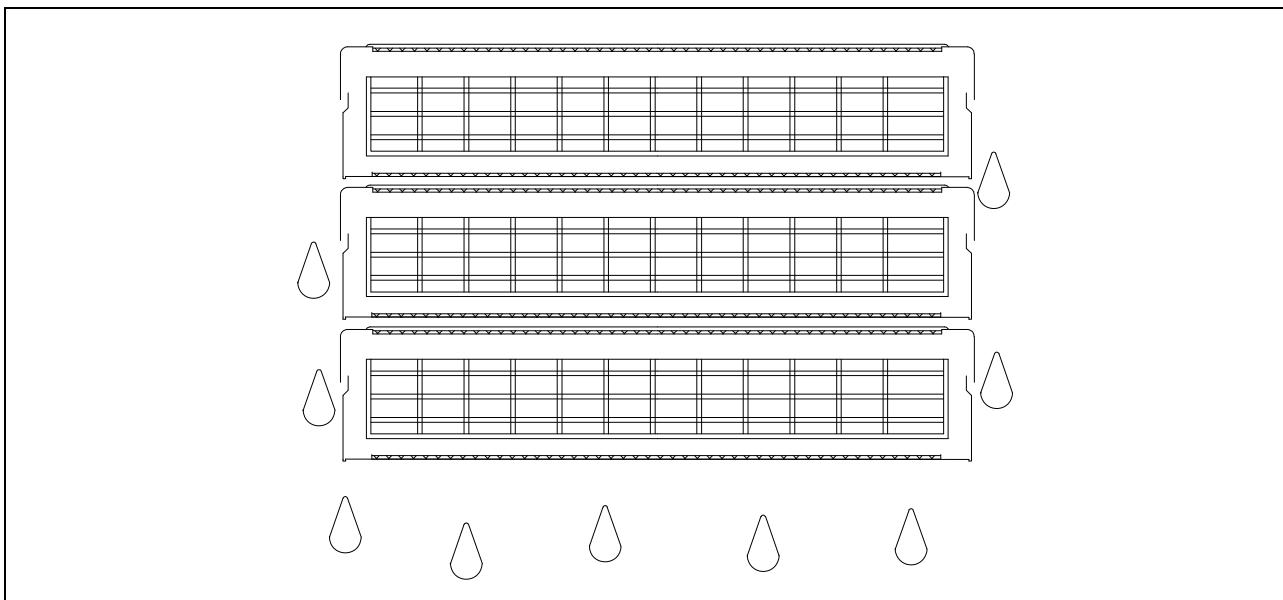
"Soft" sterilization packages such as paper bags or transparent sterilization packages can be sterilized either in sterilization containers or sterilization baskets. To enable better drying, arrange such soft sterilization packages side-by-side and close to each other. This allows condensation to run off the packages, while at the same time preventing them from expanded excessively, and possibly bursting at the seams.



Packing "soft" sterilization packages in sterilization containers

9.3.6 Stacking sterilization containers

When arranging sterilization containers, care should be taken that drops of condensate do not wet items being sterilized beneath, but can flow away to the base of the chamber. The best arrangement is a stack of sterilization containers of the same size, so that condensate can flow down the sides.



Stacked sterilization containers

9.3.7 Removing the sterilized items

Immediately after the sterilization process, some condensate may remain on the sterilized items. However, heat transfer from the sterilized objects can evaporate this after the sterilization process has been completed.

The German standard DIN 58953 Part 7 Section 7 comments on residual moisture on paper bags or transparent sterilization paper after sterilization:

"...Small amounts of water on the surface of packages do not represent a cause for concern if they dry completely within thirty minutes after removal from a steam sterilization system...."

9.3.8 Improving the drying

The drying can be improved by the following measures:

- Pre-heating the autoclave (empty sterilization)
- Arranging transparent sterilization and paper packing vertically
- Selecting the program option "Additional drying"
- Extending the drying times (please consult your MELAG customer service).

User manual

Euroklav® 23 VS+ Euroklav® 29 VS+

from software version 5.21



EN

Dear customer,

We thank you for your confidence demonstrated by the purchase of this MELAG product. As an owner-run and operated family concern founded in 1951, we have a long history of successful specialization in hygiene products for practice-based use. Our focus on innovation, quality and the highest standards of operational reliability has established MELAG as the world's leading manufacturer in the instrument reprocessing and hygiene field.

You, our customer are justified in your demand for the best products, quality and reliability. Providing "**competence in hygiene**" and "**Quality – made in Germany**", we guarantee that these demands will be met. Our certified quality management system is subject to close monitoring: one instrument to this end is our annual multi-day audit conducted in accordance with EN ISO 13485. This guarantees that all MELAG products are manufactured and tested in accordance with strict quality criteria.

The MELAG management and team.

CE 0197

Contents

1 General guidelines	5	Program run.....	25
Symbols used.....	5	Program end.....	26
Formatting rules	5	Manual program abort	26
Disposal	5	Program abort before the start of drying	27
2 Safety.....	6	Program abort after the start of drying	27
3 Performance specifications	8	Removing the sterile material	28
Intended use	8	Storing sterile material.....	28
Sterilization procedure	8		
Type of the feed water supply	8		
Safety equipment	9		
Performance characteristics of sterilization programs	9		
Program sequences	10		
Overview of programs	11		
SETUP menu - Function	12		
4 Description of the device.....	13		
Scope of delivery.....	13		
Views of the device	14		
Symbols on the device	15		
Operating panel.....	16		
Load mounts	17		
5 First steps	18		
Setup and installation.....	18		
Feed water supply	18		
Using the internal water storage tank	18		
Wastewater connection.....	19		
Switching on the steam sterilizer.....	19		
Opening and closing the door	19		
Setting the date and time	20		
6 Sterilization	21		
Preparing the load.....	21		
Reprocessing textiles.....	21		
Reprocessing instruments	21		
Loading the steam sterilizer	22		
Closed sterile containers.....	22		
Soft sterilization packaging	22		
Multiple wrapping	22		
Mixed loads.....	23		
Loading versions.....	23		
Selecting the program	23		
Additional program options	24		
Selecting automatic preheating.....	24		
Selecting additional drying	25		
Starting the program	25		
7 Logging.....	29		
Batch documentation.....	29		
Displaying the daily batch counter.....	29		
Displaying the total batch counter	29		
Output media	30		
Using a computer as an output medium (without a network connection)	30		
Outputting logs immediately and automatically	32		
Subsequent log output.....	33		
Displaying the log memory	34		
Deleting logs in the internal log memory	34		
Reading logs correctly	34		
8 Function checks	36		
Automatic functional checks	36		
Manual functional checks	36		
Vacuum test.....	36		
Bowie & Dick test.....	37		
Checking the quality of the feed water	37		
Pre-heating temperature of the sterilization chamber...	37		
9 Maintenance	38		
Servicing intervals	38		
Cleaning	38		
Sterilization chamber, door gasket, mount, trays	38		
Housing parts	39		
Internal storage tank.....	39		
Avoiding staining	40		
Replacing the door gasket.....	40		
Replacing or sterilizing the sterile filter	41		
Replacing the sterile filter	41		
Sterilizing the sterile filter	41		
Cleaning the filter in the sterilization chamber.....	42		
Maintenance	43		
10 Pause times	44		
Frequency of sterilization.....	44		
Operating pauses	44		
Decommissioning	44		
Transport	45		

Transport within the practice	45	Opening the door in an emergency following a power outage	54
Transport over long distances	45	Replacing the device fuses	55
Recommissioning after relocation	45		
11 Malfunctions	46	12 Technical data	56
Warnings	47	13 Accessories and spare parts	57
Fault messages	50	Glossary	58

1 General guidelines

Please read this user manual carefully before commissioning the device. The manual includes important safety instructions. Make sure that you always have access to digital or printed version of the user manual.

Should the manual no longer be legible, is damaged or has been lost, you can download a new copy from MELAG download centre at www.melag.com.

Symbols used

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

Formatting rules

Example	Description
see Chapter 2	Reference to another text section within this document.
Log	Words or phrases appearing on the display of the device are marked as display text.
	Prerequisites for the following handling instruction.
	Reference to the glossary or another text section.
	Information for safe handling.

Disposal

MELAG devices are synonymous with long-term quality. When you eventually need to decommission your MELAG device, the required disposal of the device can be carried out by MELAG in Berlin. Simply contact your stockist.

Dispose of  **components**,  **spare parts**,  **accessories**,  **equipment** and consumables that you no longer need properly. Comply with all relevant disposal regulations regarding potentially contaminated waste.

The packaging protects the device against transport damage. The packaging materials have been selected for their environmentally-friendly and recycling properties and can be recycled. Returning the packaging to the material cycle reduces the amount of waste and saves raw materials.

MELAG draws the operator's attention to the fact that they are responsible for deleting personal data on the device to be disposed of.

MELAG draws the operator's attention to the fact that they may be legally obliged (e.g. in Germany according to ElektroG) to remove used batteries and accumulators non-destructively before handing over the device, provided they are not enclosed in the device.

2 Safety



When operating the device, comply with the following safety instructions as well as those contained in subsequent chapters. Use the device only for the purpose specified in these instructions. Failure to comply with the safety instructions can result in injury and/or damage to the device.

Qualified personnel

- As with the preceding instrument reprocessing, only **►competent personnel** should undertake sterilization using this steam sterilizer.
- The operator must ensure that the users are regularly trained in the operation and safe handling of the device.

Carrying the steam sterilizer

- The device should always be carried by two people.
- Use the correct carrying straps to carry the device.

Setup, installation and commissioning

- Check the device after unpacking for any damage suffered during transport.
- The device should only be setup, installed and commissioned by MELAG authorised persons.
- Have the electrical connection and the water supply and waste water connections installed only by trained personnel.
- Using the optional electronic leak detector (water stop) minimises the risk of water damage.
- Do not install or operate the device in potentially explosive areas.
- Install and operate the device in a frost-free environment.
- The device is conceived for use outside the patient area. The device should be located a minimum of 1.5 m radius away from the treatment area.
- The documentation media (computer, CF card reader etc.) must be placed in such a way that they cannot come into contact with liquids.
- Observe all the information contained in the technical manual during commissioning.

Power cable and power plug

- Comply with all legal requirements and locally-specified connection conditions.
- Never operate the device if the plug or power cable are damaged.
- The power cable or plug should only be replaced by **►authorised technicians**.
- Never damage or alter the power plug or cable.
- Never bend or twist the power cable excessively.
- Never unplug by pulling on the power cable. Always take a grip on the plug.
- Never place any heavy objects on the power cable.
- Ensure that the power cable does not become jammed in.
- Never lead the cable along a source of heat.
- Never fix the power cable with sharp objects.
- The mains socket must be freely accessible after installation so that the device can be disconnected from the electrical mains at any time if necessary by pulling the mains plug.

Spring safety valve

- Position the device in such a way that the faultless functioning of the spring loaded safety valve is guaranteed. The spring loaded safety valve must be able to move freely and not become stuck or blocked.

Reprocessing and sterilization

- Follow the manufacturer's instructions of your textile articles and instruments regarding their reprocessing and sterilization.
- Comply with the relevant standards and directives applicable to the reprocessing and sterilization of textiles and instruments (in Germany e.g. from the [RKI](#) and [DGSV](#)).
- Only ever use packaging material and systems which have been cleared by their manufacturer for steam sterilization.

Program abort

- Please observe that depending on the time of the program abort, opening the door following a program abort can lead to hot steam leaving the sterilization chamber.

Removing the sterile material

- Never use force to open the door.
- Use a tray lifter to remove the tray. Never touch the sterilized equipment, the chamber, the mount or the inside of the door with bare hands. The components are hot.
- Check the packaging on the sterile material for damage when removing it from the steam sterilizer. Should the packaging be damaged, re-pack the [load](#), and re-sterilize it.

Storage and transport

- Store and transport the device frost-free.
- The steam sterilizer should always be carried by two people.
- Use the correct carrying straps to carry the device.

Maintenance

- Maintenance should only be performed by [authorised technicians](#).
- Maintain the specified maintenance intervals.
- Only original MELAG spare parts may be used.
- Never open the device housing. Incorrect opening and repair can compromise electrical safety and pose a danger to the user. The device may only be opened by an [authorised technician](#) who must be a [qualified electrician](#).

Malfunctions

- Should the device issue the same malfunction message repeatedly, turn off the device and if necessary, inform your stockist.
- The device may only be serviced by [authorised technicians](#).

Notification requirement in the event of serious incidents in the European Economic Area

- Please note that all series incidents that occur in relation to a [medical device](#) (e.g. death or a serious deterioration in a patient's state of health), which were presumably caused by the device must be reported to the manufacturer (MELAG) and the competent authority of the member state in which the user and/or the patient resides.

3 Performance specifications

Intended use

The steam sterilizer is intended for use in every kind of general medical field where no sterilization cycles of type "B" are required for the instruments sterilized and the type of packaging used.

According to **►EN 13060**, this steam sterilizer is performing sterilization cycles of type "S". As an universal steam sterilizer, it is suited for sterilizing wrapped/unwrapped solid instruments, simple hollow items and small quantities of textiles. The steam sterilizer is not intended for use on patients or in the patient environment. Typical users are doctors, instructed practice employees and service technicians.

⚠ WARNING

Warning of material damage and injury

Any attempt to sterilize fluids can result in a **►delay in boiling**. This can cause damage to the device and/or scalding.

- Never use this device to sterilize fluids. It is not licensed for the sterilization of fluids.

Sterilization procedure

The steam sterilizer sterilizes on the basis of the pre-vacuum method combined with the fractionated flow procedure.

This guarantees the complete and effective wetting/penetration of the **►load** with saturated steam.

The steam sterilizer uses integrated steam generation to generate sterilizing steam. Steam is generated in the sterilization chamber upon program start. This establishes a pre-defined pressure and a set temperature. The sterilization chamber is protected against overheating.

You can sterilize instruments or textiles one after the other in a very short time, achieving excellent drying results.

Automatic preheating

If preheating is activated, the cold chamber is heated up to the preheating temperature of the particular program before program start, or this temperature is held between two program runs. This reduces program times and the accretion of condensation, thus improving drying results.

Type of the feed water supply

The steam sterilizer works with both a one-way **►feed water** system and in accordance with the feed water circulation system. The one-way feed water system uses fresh demineralized or distilled feed water for every sterilization procedure. The quality of the feed water is subject to permanent monitoring via integrated **►conductivity measurement**. If the instruments are prepared carefully beforehand, this serves largely to prevent stain accretion on the instruments and soiling of the steam sterilizer. When using the feed water circulation system, the steam sterilizer uses less water, as the feed water is used for multiple sterilization cycles. Here too, the quality of the feed water is subject to permanent monitoring via integrated **►conductivity measurement**.

The supply with feed water for steam generation is performed automatically via an internal storage tank or a water treatment unit (e.g. MELAdem 40, MELAdem 47).

The technical manual provides detailed information regarding connection to a water treatment unit.

Safety equipment

Internal process monitoring

A **process evaluation system** is integrated in the electronics of the device. It compares the process parameters, such as temperature, time and pressure, during a program run. It monitors the parameters in terms of their threshold values and ensures safe and successful reprocessing. A monitoring system checks the device components of the device for their functionality and their plausible interaction. If one or more parameters exceeds pre-determined threshold values, the device issues warning or malfunction messages and if necessary, aborts the program. In the case of a program abort, follow the instructions on the display.

The device works with an electronic parameter control. This serves to optimise the total operating time of a program in dependence on the load.

The device constantly checks pressure and temperature in the sterilization chamber and prevents the door from being opened during the program run and when over-pressure has built up.

Quantity and quality of the feed water

The quantity and quality of the **feed water** is automatically checked before every program start.

Performance characteristics of sterilization programs

The results in this table show which inspections were performed on the steam sterilizer. The marked fields demonstrate compliance with all the applicable sections of the standard **EN 13060**.

Type tests	Universal-Program	Quick-Program S	Gentle-Program	Prion-Program
Program type in accordance with EN 13060	Type S	Type S	Type S	Type S
Dynamic pressure test of the sterilization chamber	X	X	X	X
Air leakage	X	X	X	X
Empty chamber test	X	X	X	X
Solid load	X	X	X	X
Porous partial load	X	--	X	X
Porous full load	--	--	--	--
Simple hollow items	X	X	X	X
Product with narrow lumen	--	--	--	--
Single wrapping	X	--	X	X
Multiple wrapping	X	--	X	X
Drying solid load	X	X	X	X
Drying, porous load	X	--	X	X
Sterilization temperature	134 °C	134 °C	121°C	134 °C
Sterilization pressure	2.1 bar	2.1 bar	1.1 bar	2.1 bar
Plateau time	5:30 min	3:30 min	20:30 min	20:30 min

X = Complies with all applicable sections of the standard **EN 13060**

Program sequences

Regular sterilization program

After program start, you can follow the program run on the display. It shows the chamber temperature and pressure as well as the time until the end of sterilization and drying.

Program phase	Description
1. Pre-vacuum phase	Air is evacuated in the pre-vacuum and steam is generated in the sterilization chamber which produces over-pressure.
2. Air removal phase	The fractionated flow procedure removes the air from the chamber through pulsing repeated steam injection and removal. Depending on the program selected and the current chamber temperature upon program start, further fractionation can also follow.
3. Heating phase	The heating phase follows the air removal phase. The pressure and temperature increase until the program-specific sterilization parameters have been reached.
4. Sterilization phase	Once the pressure and temperature correspond to the program-dependent nominal values, the actual sterilization phase begins. The sterilization time is indicated on the display.
5. Pressure release	Pressure is released after the end of the sterilization phase.
6. Drying phase	The drying phase begins after the pressure release. This is performed in two stages: flow drying and vacuum drying (pulsing over-pressure drying).

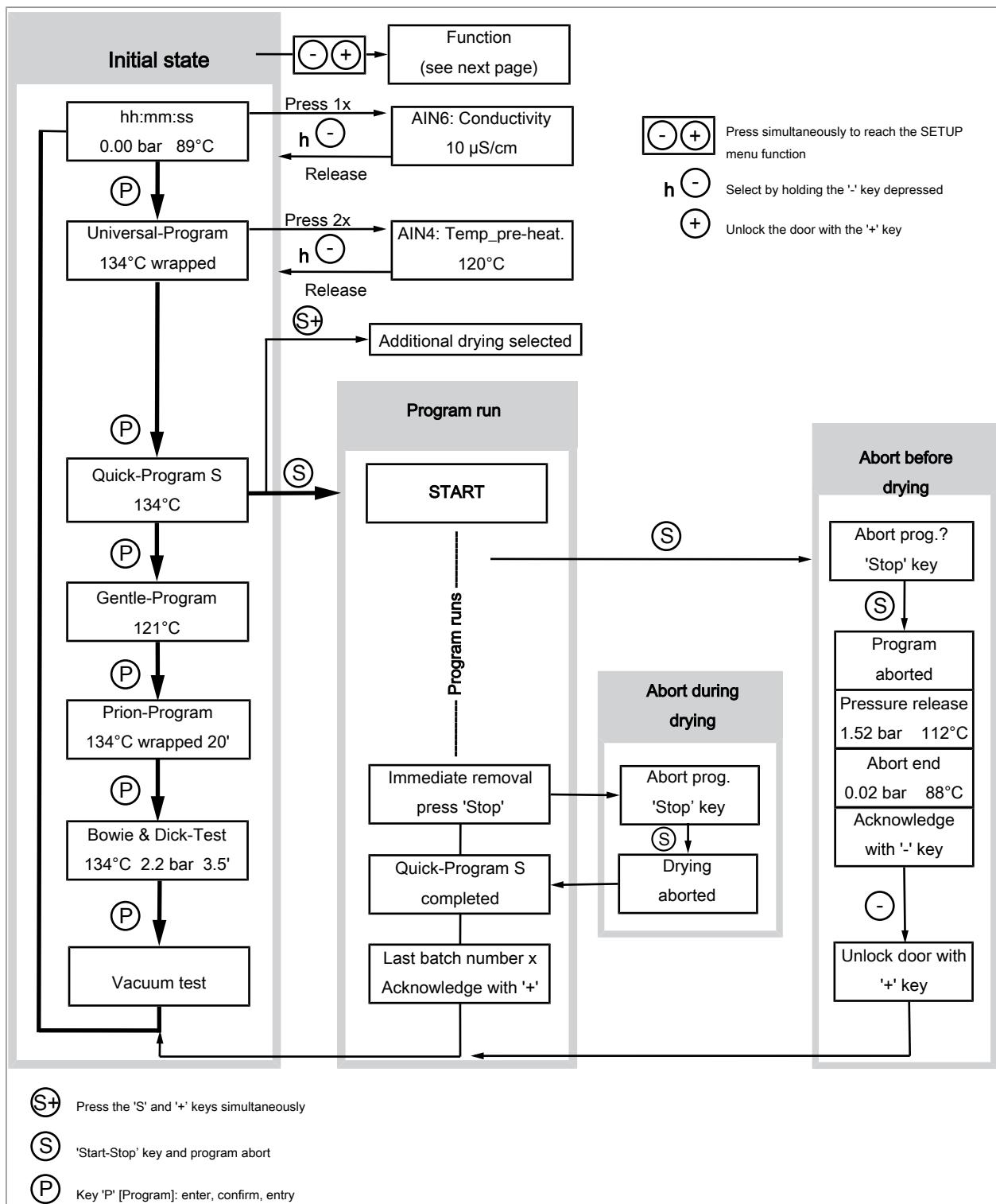
Vacuum test

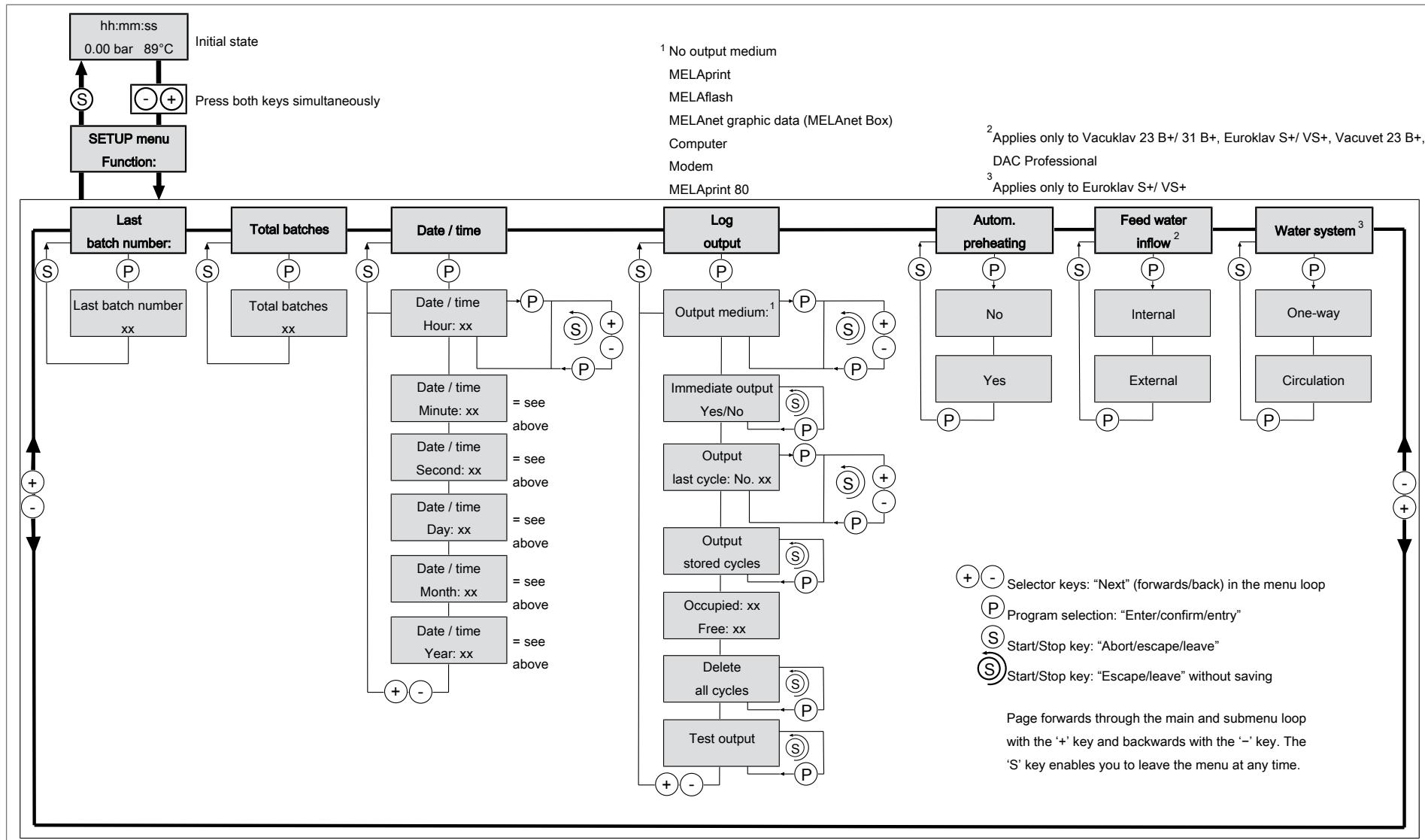
The vacuum test measures the leakage rate. No real sterilization is performed. The test is performed with a cold, dry and unloaded device.

Program phase	Description
1. Air removal phase (evacuation)	The sterilization chamber is evacuated until the pressure for the vacuum test has been reached.
2. Equilibration time	An equilibration time of 5 min will follow.
3. Measurement time	The measuring time is 10 min. The pressure increase within the sterilization chamber is measured during the measurement time. The evacuation pressure and the equilibration time or measurement time are shown on the display.
4. Test end	The display shows the test result and the batch number. The number of the total batches and the leakage rate can also be displayed.

Overview of programs

MAIN menu





4 Description of the device

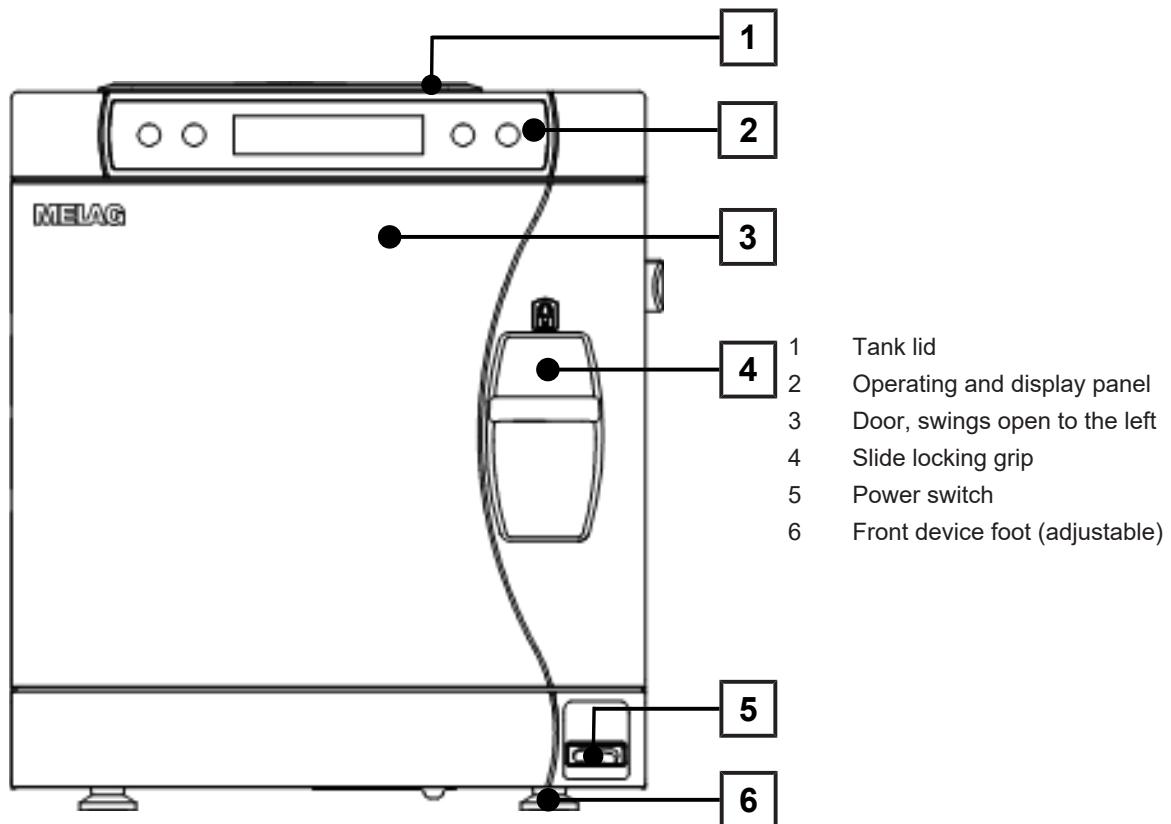
Scope of delivery

Please check the scope of delivery before setting up and connecting the device.

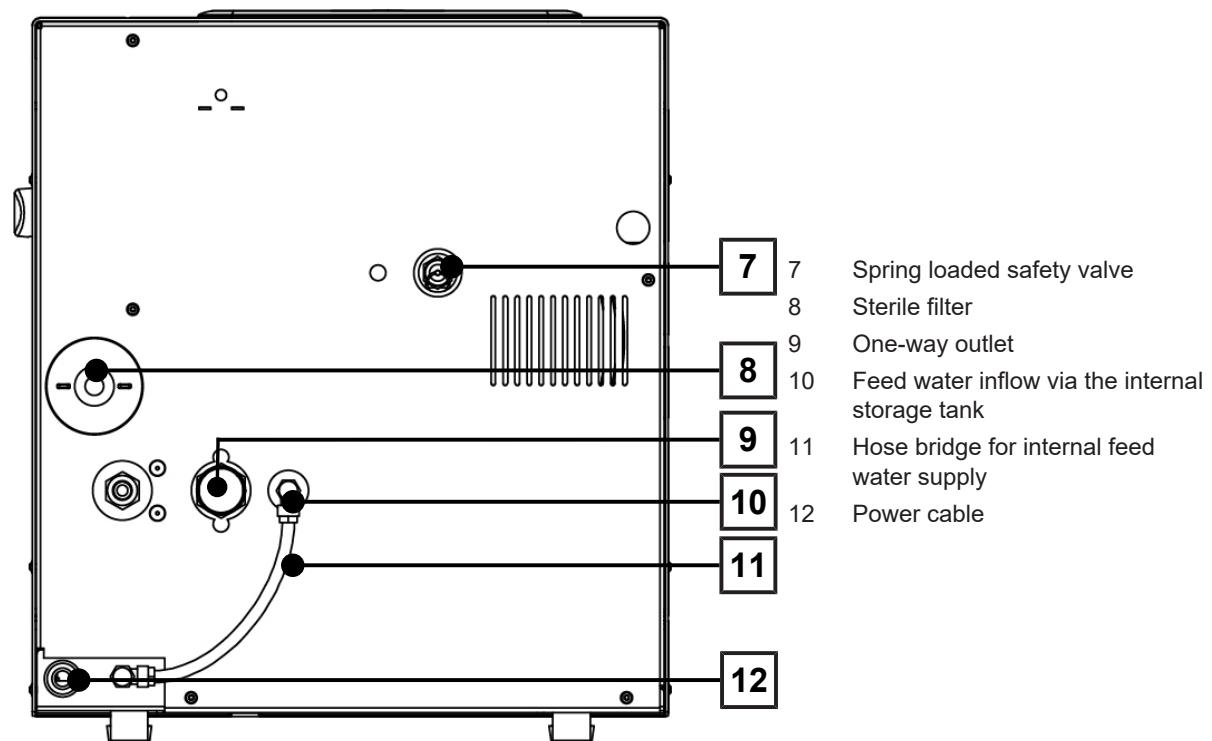
- Euroklav 23 VS+ or Euroklav 29 VS+
- User manual
- User manual Accessories for small steam sterilizers
- Technical Manual
- Warranty certificate
- Manufacturer's inspection report including declaration of conformity
- Record of installation and setup
- Mount for trays or sterilization containers
- Hose for emptying the interior storage tank
- Key for the "vacuum / flow" chamber filter
- Lever for emergency release of the door
- 2x replacement device fuses on the inside of the steam sterilizer door
- Tray lifter

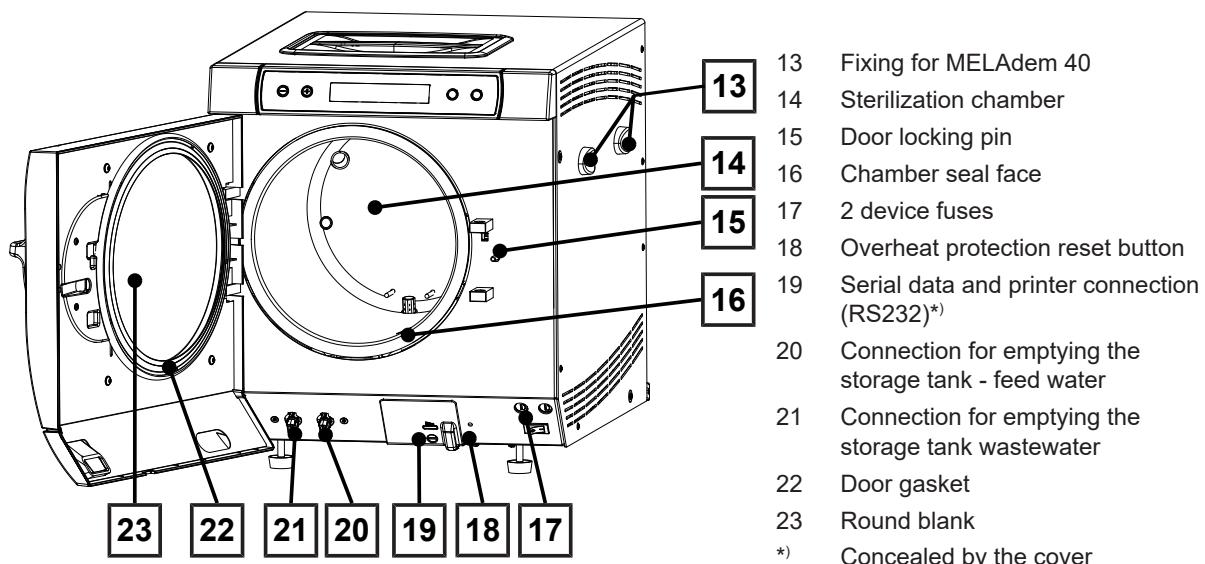
Views of the device

Front



Rear panel



View of the interior**Symbols on the device****Type plate**

Manufacturer of the product



Date of manufacture of the product



Label as medical device



Observe user manual or electronic user manual



Do not dispose of product in household waste



CE marking



Identification number of the notified body responsible for conformity assessment according to Pressure Equipment Directive 2014/68/EU



Identification number of the notified body responsible for conformity assessment according to Regulation (EU) 2017/745 on medical devices



Volume of the sterilization chamber



Working overpressure in sterilization chamber

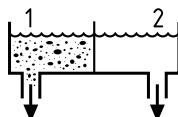


Operating temperature in sterilization chamber



Electrical connection of the product: Alternating current (AC)

Front of the device



Bleed valves, internal storage tanks:
1 = Wastewater side 2 = Feed water side



Reset button for the overheat protection of the capillary tube controller



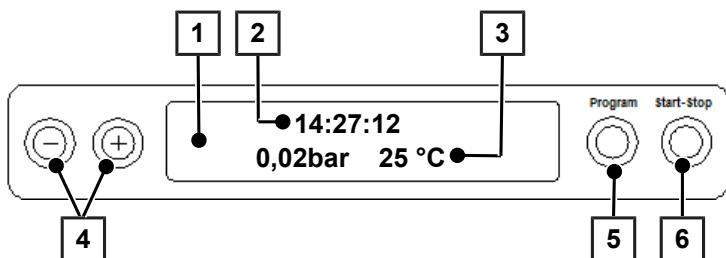
Switching on device



Switching off device

Operating panel

The operating panel consists of a two-row alphanumerical LC display and four membrane keys.



- 1 **2-row LC display**
for displaying the program status and parameters
- 2 **Time (h:min:s)**
- 3 **Chamber pressure (bar) and (steam) temperature (°C)**
- 4 **Function keys '-' and '+'**
for the selection, setting and display of special functions: print, date/time, preheating, total batches, conductivity, acknowledge malfunction, key '+' for unlocking the door
- 5 **Program selection key 'P'**
for selecting the sterilization program / test program and selection / setting of the options (submenus) of the special functions
- 6 **Start – Stop key 'S'**
for starting programs, aborting programs / drying and controlling the special functions

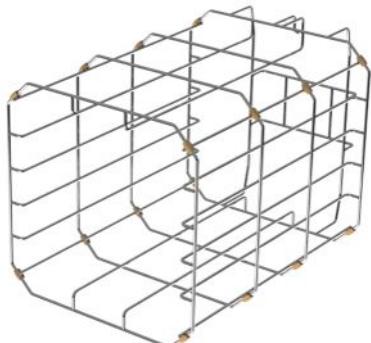
Initial state

Each time the device is switched on, the display changes to the initial state, showing the current time, the chamber pressure in bar and the (steam) temperature in °C.

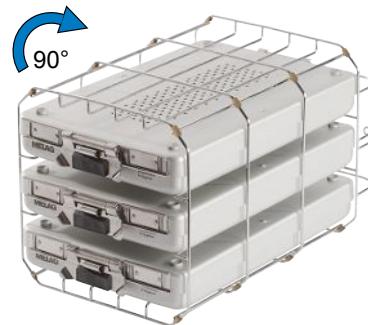
Load mounts

Detailed information regarding the various mounts, their combinability with various load carriers and their use can be found in the separate document "User Manual - Accessories for small steam sterilizers".

Mount A Plus

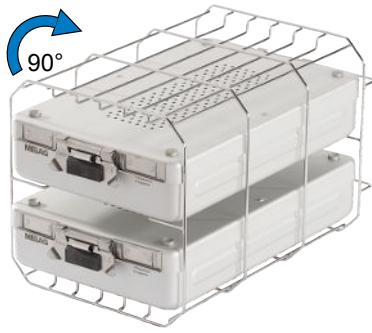
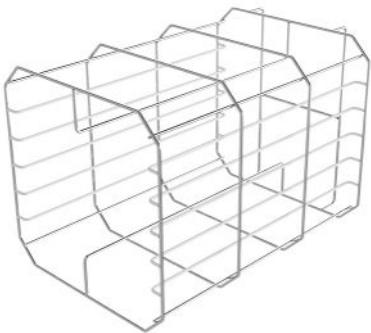


for max. 5 trays



for max. 3 MELAstore Box 100
(mount rotated by 90°)

Mount D



for max. 4 trays (29 x 19 cm) or
2 MELAstore Box 200 or
for 2 high sterilization containers (23M/
28M)
(mount rotated by 90°)

5 First steps

Setup and installation

! PLEASE NOTE

For setup and installation, observe the information in the technical manual. This contains all building-side requirements.

Record of installation

As evidence of proper setup, installation and initial commissioning as well as your warranty claim, the record of installation must be completed by an authorised specialist and a copy sent to MELAG.

Feed water supply

Steam sterilization requires the use of [►distilled](#) or [►demineralised water](#), known as [►feed water](#). Annex C of [►EN 13060](#) specifies the guideline values to be observed.

The [►feed water](#) supply is effected either via the internal storage tank or via a separate water treatment unit (e.g. MELAdem 40/MELAdem 47). When using the internal storage tank for the feed water supply, it is necessary to refill it. The steam sterilizer will issue notification at the relevant time. The used feed water, so called wastewater is either collected in the internal storage tank on the wastewater side (left) and emptied manually or disposed of automatically via a building-side wastewater connection.

A water treatment unit is connected to the domestic water supply. It produces the feed water which the steam sterilizer requires for steam generation. The use of a water treatment unit guarantees the availability of sufficient feed water. You no longer have to manually fill the internal water storage tank.

! PLEASE NOTE

Should you wish to use a water treatment unit from another manufacturer, consult MELAG.

Using the internal water storage tank

When feed water is supplied via the internal storage tank, this needs to be filled manually from time to time. The steam sterilizer will issue notification at the relevant time.

The internal storage tank holds max. 4 l. This volume of feed water is sufficient for up to 7 sterilization runs.

The steam-generating system requires at least 1 l to ensure the feed water supply.

Ensure the following when filling:

- No feed water should be added to the internal storage tank during operation, as steam vapours may escape from the tank during operation.
- During operation, the surfaces on the tank (e.g. lid) may be hot.
- To fill the storage tank with fresh feed water remove the cover and fill the right-hand chamber of the storage tank (right) with fresh feed water up to the MAX mark.

Setting the feed water supply on the steam sterilizer

The **internal** function must be set in order to enable feed water supply via the internal storage tank. The **external** function must be set in order to enable feed water supply via a water treatment unit.

1. Select the SETUP menu **Function** by pressing the '+' and '-' keys simultaneously. The display shows the message **Function: Last batch number**
2. Navigate using the '+' or '-' key until the display shows: **Function: Feed water supply**.
3. Press the 'P' key. The display shows the option currently set.
4. Press the 'P' key again to change to the desired setting (**internal/external**).
5. Press the 'S' key to save the setting and to leave the menu.

Repeated pressing of the 'S' key enables you to leave the menu entirely and return to the display initial state.

Wastewater connection

The wastewater can either be collected in the internal storage tank on the wastewater side (left) and be removed manually or be let out automatically via the one-way outlet. An upgrade kit can be ordered to connect the steam sterilizer to the wastewater. Detailed information regarding the connection to the wastewater is provided in the technical manual.

Switching on the steam sterilizer

- ✓ The steam sterilizer is connected to the electricity supply.
- Switch on the device at the power switch.

The display switches between the initial state and the notification **Unlock door with '+' key**, as long as the door is closed.

! PLEASE NOTE

The trays and all accessories must be removed from the sterilization chamber directly after the steam sterilizer having been switched on for the first time and before initial commissioning.

After device activation, a **heating up time** of approx. 5 min (Euroklav 23 VS+) or approx. 3 min (Euroklav 29 VS+) is required. A program will be started only after the target temperature has been reached.

! PLEASE NOTE

When switching off the device via the power switch, wait 3 s before switching it back on.

Opening and closing the door

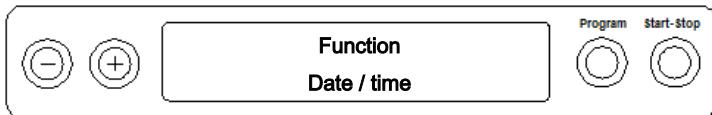
The door can only be opened when the display shows **Acknow. with '+' key / Unlock door with '+' key**.

1. Press the '+' key. You can open the door after hearing an audible click.
2. To shut the door, press it lightly against the device and slide the slide locking grip downwards to its at the same time.

Setting the date and time

Correct batch documentation requires the correct date and time setting on the steam sterilizer. Ensure that you take into account any clock change, as this is not adjusted automatically. Set the date and time as follows:

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously.
→ The display will show the message **Function: Last batch number**.
2. Navigate in the **Function** menu using the '+' or '-' keys until the display shows:



3. Press the 'P' key to confirm.
→ The current hour is displayed.
4. Choose one of the following setting possibilities using the '+' or '-' key: Hour, minute, second, day, month, year.
5. To e.g. adjust the hours parameter, press the 'P' key to confirm.
→ The current value flashes on the display.
6. You can increase or reduce the value using the '+' and '-' keys.
7. Confirm with the 'P' key in order to save the value.
→ The current value set no longer flashes on the display.
8. Proceed in a similar fashion to alter the other parameters.
9. After completing the settings, press the 'S' key to leave the menu.
→ The display will show **Function: Date / Time**.
10. Repeated pressing of the 'S' key enables you to leave the menu and the display returns to its initial state.

6 Sterilization

Preparing the load

Always clean and disinfect properly before sterilization. Only in this way is it possible to guarantee the subsequent sterilization of the **►load**. The materials used, cleaning agents and reprocessing procedure are of decisive significance.

Comply with the following for safe handling:

NOTICE

Only ever operate the steam sterilizer with a sterile filter inserted.

Reprocessing textiles

The incorrect reprocessing of textiles, e.g. a textile package can prevent steam penetration or produce poor drying results. This may result in the textiles **not** being sterile.

Comply with the following points when **►reprocessing** textiles and placing the textiles in sterile containers:

Without sterilization container

- Comply with both the reprocessing instructions of the textile manufacturer the relevant standards, guidelines and directives (in Germany e.g. of the **►RKI** and **►DGSV**).
- Arrange the folds in the textiles parallel to each other.
- Fold the textiles in such a way that permits use of the entire tray.

With sterilization container

- Stack textiles vertically wherever possible and not too closely together in the sterile container. This enables the development of flow channels.
- If textile packages do not remain together, wrap the textiles in sterilization paper.
- Only ever sterilize dry textiles.
- The textiles may not be permitted to come into direct contact with the sterilization chamber; otherwise they will become saturated with **►condensate**.

Reprocessing instruments

Unwrapped sterile material loses its sterility on contact with ambient air. If you intend to store your instruments steriley, wrap them in suitable packaging before sterilization.

When **►reprocessing** used and brand-new instruments, comply with the following:

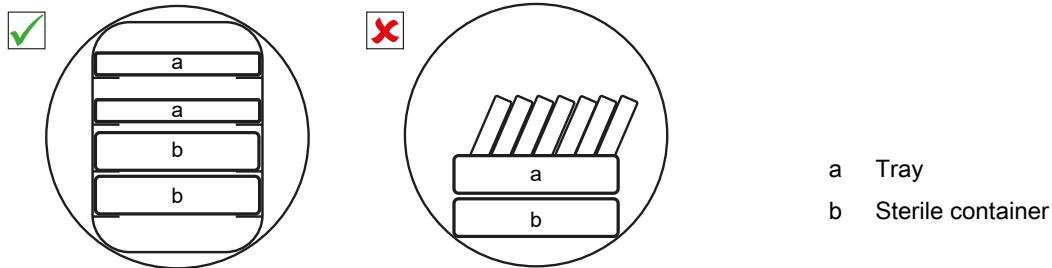
- Always observe both the instrument manufacturer's reprocessing instructions and the relevant standards, guidelines and directives (in Germany, for example, from **►RKI**, **►DGSV** and **►DGUV Regulation 1**).
- Clean the instruments exceptionally thoroughly e.g. using an ultrasonic device or washer-disinfector.
- Rinse the instruments after washing and disinfecting, where possible with demineralised or distilled water, and then dry the instruments thoroughly with a clean, non-fuzzing cloth.
- Use only those care agents suitable for steam sterilization. Consult the manufacturer of the care agents. Do not use any water repellent agents or oils impermeable to steam.
- When using ultrasound devices, care equipment for handpieces and washer-disinfectors, comply with the manufacturer's reprocessing instructions.
- Remove any residual disinfection and cleaning fluids to avoid corrosion. Otherwise, this could result in increased maintenance requirements and a restriction of the device function.

Loading the steam sterilizer

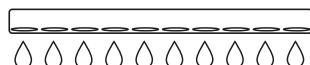
Effective sterilization and good drying is only possible if the steam sterilizer has been loaded correctly.

Ensure the following during loading:

- Insert trays or sterile containers in the sterilization chamber only with their appropriate mount.



- Wherever possible, ensure the separate sterilization of textiles and instruments in separate sterile containers or sterilization packages. This leads to better drying results.
- The use of paper tray inserts can result in poor drying results.
- Use perforated trays such as those from MELAG. Only in this way can **condensate** drain off. Non-perforated bases or half-shells for holding the **load** lead to poor drying results.



Packaging

Only ever use packaging materials and systems (**sterile barrier systems**) which fulfil the standard **EN ISO 11607-1**. The correct use of suitable packaging is important in achieving successful sterilization results. You can use re-usable rigid packaging systems or soft packaging such as transparent sterilization package, paper pouches, sterilization paper, textiles or fleece.

Closed sterile containers

Please comply with the following when using closed sterile containers:

- Use aluminium sterile containers. Aluminium retains and conducts heat and thus accelerates drying.

PLEASE NOTE: MELAG sterilization containers fulfil all requirements in accordance with EN 868-8 for successful sterilization and drying. They have a perforated lid and base and are fitted with disposable paper filters.

Soft sterilization packaging

Soft sterilization packages can be used in both sterile containers and on trays. Please comply with the following when using soft sterilization packages e.g. MELAfol:

- Arrange soft sterilization packaging in a perpendicular position and at narrow intervals.
- Place transparent sterilization packages on their edge wherever possible and with the paper side facing downwards.
- Do not place multiple soft sterilization packages flat on top of each other on a tray or in a container.
- If the seal seam tears during sterilization, the packaging could be too small or the sealing pulse too low. Re-pack the instruments and if necessary, extend the sealing pulse on the film sealing device or make a double seam. Sterilize the sterilization material again.

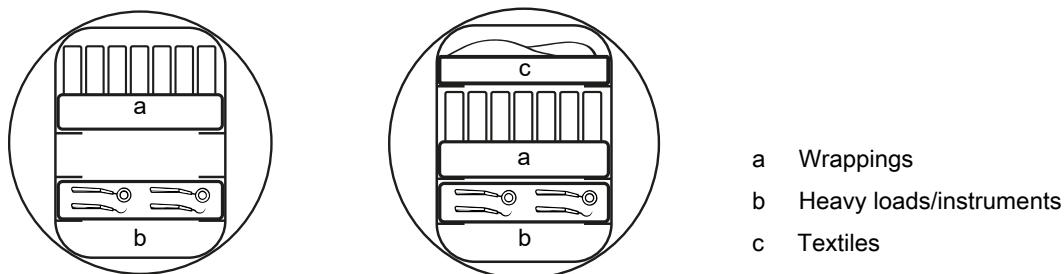
Multiple wrapping

The device uses a fractionated flow procedure. This permits the use of **multiple wrapping** when sterilizing textiles.

Mixed loads

Please observe the following when sterilizing **►mixed loads:**

- Always place textiles at the top
- Sterile containers at the bottom
- Place unwrapped instruments at the bottom
- Place the heaviest loads at the bottom
- Transparent sterilization packages and paper packages on the top. Exception: At the bottom in combination with textiles



Loading versions

Example:

Loading versions*)	Euroklav 23 VS+	Euroklav 29 VS+
	Instruments / textiles	Instruments / textiles
Max. weight per component	2 kg / 1 kg (0.8 kg**)	2 kg / 0.8 kg
Maximum total weight***)	4 kg / 1 kg (0.8 kg**)	3 kg / 0.8 kg

*) For MELAG mounts, trays, sterilization containers, see [Accessories and spare parts](#) [► page 57]

**) In the Gentle-Program.

***) This applies solid loads (e.g. instruments) including the weights of mounts, trays and sterilization containers. This applies porous loads (e.g. textiles) excluding the weights of mounts, trays and sterilization containers.

Loading patterns can be found in the separate document "User Manual - Accessories for small steam sterilizers".

Selecting the program

Select by rotating between the initial state and the desired program with the program selection button 'P'.

Now select the sterilization program according to how and whether the sterilization material is wrapped. It is also necessary to take into account the temperature resistance of the sterilization material.

The following table shows which program is to be selected for which sterilization material.

	Universal-Program	Quick-Program S	Gentle-Program	Prion-Program
Sterilization temperature	134 °C	134 °C	121°C	134 °C
Sterilization pressure	2.1 bar	2.1 bar	1.1 bar	2.1 bar
Plateau time	5:30 min	3:30 min	20:30 min	20:30 min
Operating time Euroklav 23 VS+*)	22-25 min	12:30-17 min	38-41 min	38-41 min
Operating time Euroklav 29 VS+*)	20-24 min	11:30-14:30 min	34-36 min	34-39 min
Drying	approx. 25 min	approx. 10 min	approx. 25 min	approx. 25 min

*) without drying, depending on the load (full load Euroklav 23 VS+: 4 kg / Euroklav 29 VS+: 3 kg) and installation conditions (such as supply voltage)

Overview of the use of the respective sterilization programs

Program name	Packaging	Especially suitable for	Load*)	
			23 VS+	29 VS+
Universal-Program	Wrapped	Mixed loads; transmission instruments, simple hollow bodies	4 kg	3 kg
Quick-Program S	Only unwrapped (no textiles)	Single massive instruments; simple hollow bodies	4 kg	3 kg
Gentle-Program	Wrapped	Textiles; thermo-unstable items (e.g. plastic, rubber articles)	Textiles 0.8 kg Thermo-unstable equipment Good 4 kg	Textiles 0.8 kg Thermo-unstable equipment Good 3 kg
Prion-Program	Wrapped	Instruments with more stringent sterilization requirements**)	4 kg	3 kg

*) This applies solid loads (e.g. instruments) including the weights of mounts, trays and sterilization containers. This applies porous loads (e.g. textiles) excluding the weights of mounts, trays and sterilization containers.

**) The Prion-Program provides an extended plateau period at 134 °C to help reduce the risk of prion transmission - particularly when users comply with the applicable national or institutional requirements for handling potential prion contamination. The Prion-Program does not ensure complete inactivation of prions and does not claim prion inactivation.

Use the Prion-Program only as part of a validated overall reprocessing procedure, including thorough pre-cleaning and, where required, chemical prion decontamination in accordance with the applicable guidelines.

Use the Prion-Program only in accordance with the national or international guidelines applicable to you, e.g. "Hygiene requirements for the reprocessing of medical devices. Recommendation of the Commission for Hospital Hygiene and Infection Prevention (►KRINKO) at the Robert Koch Institute (►RKI) and the Federal Institute for Drugs and Medical Devices (►BfArM)" (2012, PMID: 23011095; German national guideline).

Always discard reusable medical instruments that have been in contact with high- or medium-risk tissue from patients with suspected or confirmed Creutzfeldt–Jakob disease - whether owned or borrowed. Prion proteins may be resistant to conventional sterilization processes!

Additional program options

Selecting automatic preheating

Automatic preheating is activated in delivery state.

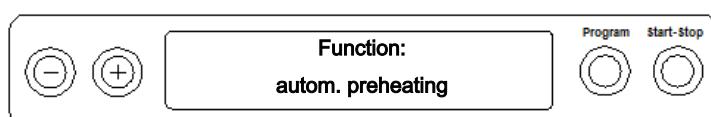
If preheating is activated, the cold chamber is heated up to the preheating temperature of the particular program before program start, or this temperature is held between two program runs. This reduces program times and the accretion of condensation, thus improving drying results.

! PLEASE NOTE

The steam sterilizer must remain continually activated for the automatic preheating. MELAG recommends activating the automatic preheating function.

To alter this setting proceed as follows:

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously until the display shows
Function: Last batch number
2. Navigate using the '+' or '-' key until the display shows:



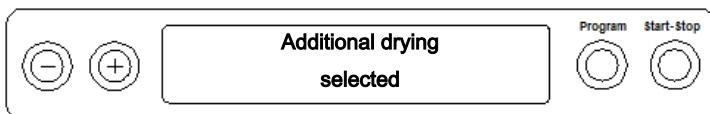
3. Press the 'P' key to confirm.
→ The display will show the option currently set e.g. **Preheating YES**.

4. Pressing the 'P' key again makes the display switch to **Preheating NO**.
→ The preheating function has been deactivated.
5. Press the 'S' key twice to exit the **Function: Autom. preheating** menu and return to the home position.

Selecting additional drying

The **Additional drying** function extends the drying time by 50 % to perform difficult drying tasks.

- ▶ Press the 'S' and '+' keys simultaneously upon program start.
The display will show:



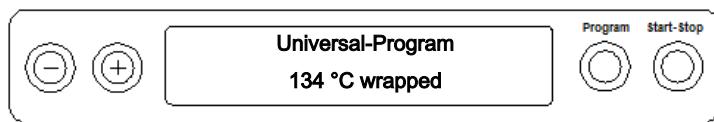
The program run will now begin.

Starting the program

NOTICE

Unsupervised operation of electrical devices, including this steam sterilizer at the operator's risk. MELAG accepts no liability for any damage that may occur as a result of unattended operation!

After having selected a program via the program selection key 'P', the display will show both the selected program and sterilization temperature as well as whether the program is suitable for wrapped or unwrapped loads.



- ▶ Press the 'S' key to start the program.
The steam sterilizer checks the **feed water supply** and its **conductivity**.

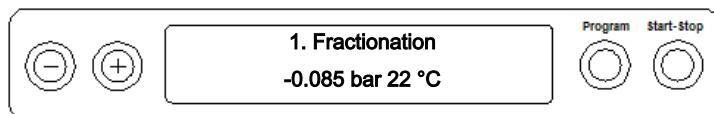
! PLEASE NOTE

When the Quick-Program S is started, the warning message **Attention: Unwrapped instruments only** appears on the display.

If the load contains exclusively unwrapped instruments, press the 'S' key again to confirm and to start the program.

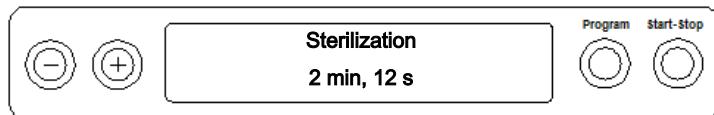
Program run

After starting the program, you can follow the program run in the display. It shows the chamber temperature and pressure as well as the time until the end of sterilization or the drying time which has passed.



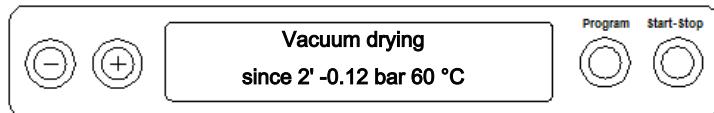
Sterilization phase

The display enables you to see whether the sterilization phase has already been completed successfully. The time left in the sterilization phase is shown in the display in alternation with the pressure and temperature.



Drying phase

The regular drying time is variable for the Quick-Program S approx. 10 min and for all other programs approx. 25 min. The display will show the corresponding message during the drying phase.

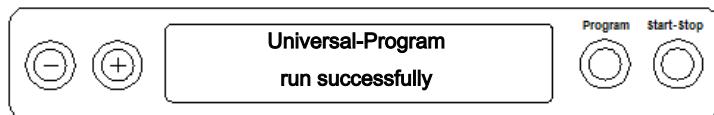


The steam sterilizer provides excellent drying of the sterile material. If difficult-to-dry items require better drying, you can undertake the following steps to improve drying:

- Load the steam sterilizer properly. Stand e.g. the transparent and paper sterilization packaging upright, see [Loading the steam sterilizer](#) [▶ page 22]. Use the optional package holder if necessary.
- Activate the function **Additional drying**, see [Selecting additional drying](#) [▶ page 25].

Program end

When the program has been completed successfully, the display shows:



If immediate output after program end is activated in **SETUP menu Function > Last batch number**, then the log of the completed program is output to the activated output media after the door is opened, see [Logging](#) [▶ page 29].

Manual program abort

You can abort a current program in all phases. If you abort the program before the end of the sterilization phase, the load is **not** sterile.

⚠ WARNING

Depending on the time of the program abort, opening the door following a program abort can lead to the egress of hot steam or hot water.

This could result in scalding.

- Use aids to remove the tray (e.g. a tray lifter or protective gloves).
- Never touch the sterile material, the sterilization chamber or the door with unprotected hands. The components are hot.

NOTICE

Aborting a running program by switching off the power switch can result in the egress of hot steam from the sterile filter and will cause the soiling of the sterile filter.

- Never abort a program by switching off at the mains.

Program abort before the start of drying

⚠ WARNING

Warning of contamination

If a program is terminated before drying starts, the load is **not** sterile.

- Re-wrap the load if necessary.
- Repeat the sterilization of the load.

Proceed as follows to abort the program before drying:

1. Press the 'S' key.
2. Confirm the following security query **Stop program?** by pressing the 'S' key repeatedly.

⚠ PLEASE NOTE

The security query will be displayed for approx. 5 s. If the 'S' key is not pressed again, the program will continue with the usual program run.

Depending on the time of the abort, pressure will be released or the device will be ventilated. A corresponding display text appears on the display.

After pressure release or ventilation, you will be asked to acknowledge the program abort.

The display will alternate between **Stop / End** and **Acknowledge with '-' key**.

3. Press the '-' key.
 - The display will alternate between **Unlock door with '+' key** and the program previously selected.
4. You can open the door after pressing the '+' key.

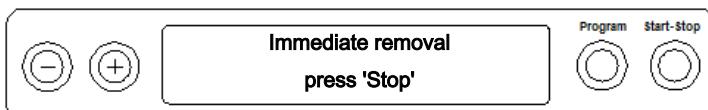
→ The log will contain: **Program stopped / Load not sterile!**

Program abort after the start of drying

You can abort the program during the drying phase via the 'S' key without the steam sterilizer registering a malfunction.

Should you abort a program after drying has started, the sterilization is having been completed successfully. The steam sterilizer will not issue a malfunction message. You should expect insufficient drying, especially in the case of wrapped **sterile material** and a full load. Sterile storage requires sufficient drying. To ensure this, allow programs with wrapped sterile material to continue to the end of the drying phase as far as possible. Unwrapped instruments sterilized in a Quick-Program dry after being removed from their own warmth.

The drying time completed thus far is indicated on the display during the drying phase. This will alternate with the display of:



Proceed as follows to abort the program during drying:

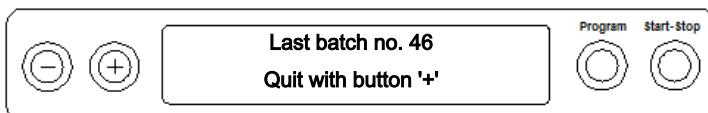
1. Press the 'S' key.

⚠ PLEASE NOTE

The security query will be displayed for approx. 5 s. If the 'S' key is not pressed repeatedly, the program will continue with the usual program run.

2. Confirm the following security query **Immediate removal 'Stop'** by pressing the 'S' key again.
 - The display confirms the abort with **Drying stopped**.

After ventilation of the chamber, the display will show: **Universal-Program run successfully** in alternation with:



If a printer or other output medium is connected to the steam sterilizer, and **Immediate output** is set to **YES**, the notification **Drying stopped** is recorded on the log.

Removing the sterile material

⚠ WARNING

Warning of contamination

If packaging is damaged or has burst after sterilization, the instruments are unsterile.

- Re-wrap the load.
- Carry out the sterilization again.

⚠ CAUTION

Warning of burns

After a program cycle, the sterilized items are hot. There is a risk of burns from hot parts and hot condensate during removal.

- Never touch the sterile material, the sterilization chamber, the mount or the inside of the door with bare hands.
- Use a tray lifter or heat protection gloves to remove the load.

If you remove the **sterile material** from the device directly after the end of the program, it is possible that the instruments can be partially damp. According to the red brochure of the Arbeitskreis für Instrumentenaufbereitung (**AKI**), single drops of water (no puddles) that dry off within 15 min are considered tolerable residual moisture in practice.

Comply with the following specifications when removing the sterile material:

- Never use force to open the door. This could damage the device or result in the emission of hot steam.
- Hold the mount level when removing it from the device. Otherwise, the load could slide off.
- Keep the trays horizontal when removing them from the device. Otherwise, the load could slide off.
- When removing the load from the device separately, ensure that the mount does not slide out unintended.

Storing sterile material

The maximum storage time is dependent on the packaging and the storage conditions. Please observe the regulatory requirements for the storage period of **sterile materials** (in Germany e.g. **DIN 58953**, Part 8 or the **DGSV** guidelines) as well as the following listed criteria:

- Follow the manufacturer's instructions on the packaging, e.g. when setting the storage period at the label printer. Comply with the maximum storage duration in accordance with the packaging type.
- Store the sterile material in a dust-protected environment e.g. in a closed instrument cabinet.
- Store the sterile material in an environment protected against moisture.
- Store the sterile material in an environment protected against excess temperature variations.

7 Logging

Batch documentation

The batch documentation serves as proof of the successful conclusion of the program and represents an obligatory part of quality assurance. The device internal log memory saves such data as the program type, **►batch** and process parameters of all the programs completed.

To obtain the batch documentation, you can output the internal log memory and transfer its data to various output media. This can be performed immediately at the end of every program or at a later point, such as at the end of the day.

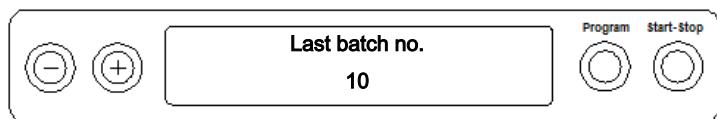
Capacity of the internal log memory

The capacity of the internal log memory is sufficient for 40 logs. If the internal log memory is full, the oldest log will be overwritten automatically at the beginning of the next program.

If a printer is connected and the option **Immediate output** has been set to **NO**, a security query will be issued before the saved log is overwritten. For further information about connecting the printer, consult the user manual of the respective device.

Displaying the daily batch counter

The last batch number of the day is shown on the display after every program run.



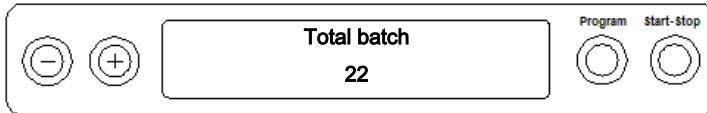
You can also arrange for the batch number to be displayed. To do so:

1. Select SETUP menu **Function** by pressing the '+' and '-' keys simultaneously. The display will show the notification **Function: Last batch number**.
2. Press the 'P' key to display the current daily batch number.
3. To return to the basic state, press the 'S' key twice.

Displaying the total batch counter

You can arrange the display of the number of the batches previously run:

1. Select SETUP menu **Function** by pressing the '+' and '-' keys simultaneously. The display will show the notification **Function: Last batch number**.
2. Navigate using the '+' or '-' keys until the display shows:



3. Press the 'P' key to display the current total batches counter.
4. To return to the basic state, press the 'S' key twice.

Output media

You are able to output and archive the logs of the completed programs on the following output media:

- MELAflash CF card printer on the [CF card](#)
- Computer, e.g. with MELAtrace software (optionally with MELAnet Box)
- MELAprint 42/44 log printer
- MELAprint 80 universal printer

In its delivery state, an option for log output is not set on the steam sterilizer.

! PLEASE NOTE

Further information about the printer (e.g. the duration of the readability of the log printouts) is specified in the associated user manual.

Using a computer as an output medium (without a network connection)

In order to be able to use a computer as an output medium, the computer must be connected to the steam sterilizer via the serial interface.

You can connect the steam sterilizer to a computer if the following conditions are fulfilled:

- ✓ The computer is either fitted with a serial interface or a USB serial adapter is connected.
- ✓ The documentation software MELAtrace is installed on the computer.

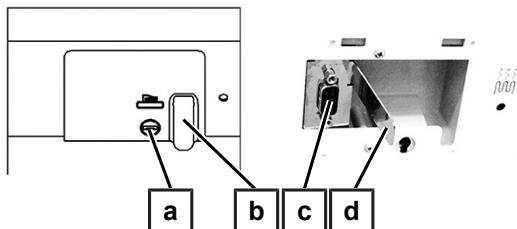
! PLEASE NOTE

The MELAnet Box is required for integration in the (practice) network.

1. Open the door of the steam sterilizer.
2. Open the white cover of the serial data and printer connection on the steam sterilizer: To do this, use a coin to turn the locking slot (pos. a) on the white cover a quarter of a turn.
3. Remove the cover.
4. Push the metal frame (pos. d) downwards slightly until it unlocks and then fold the metal frame forwards.
5. Push the metal frame (pos. d) downwards slightly until it snaps into place and can no longer fold back independently.
6. Connect the steam sterilizer to the RS232 interface (pos. c) to the computer with a fitting data connection cable.

! PLEASE NOTE

If the computer is constantly connected to the steam sterilizer, you can insert the serial cable in the cable guide (pos. b), fold in the metal strap and replace the cover.

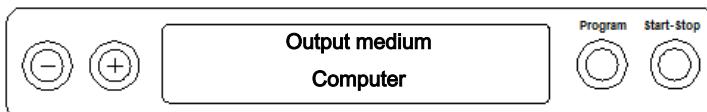


Reading out text logs on the computer

You can use the MELAtrace software to read out the logs.

The following settings are required to register the computer on the steam sterilizer:

1. Switch on the steam sterilizer.
Wait until the display shows the initial state.
2. Select SETUP menu **Function** by pressing the '+' and '-' keys simultaneously. The display will show the notification **Function: Last batch number**
3. Navigate with the '+' or '-' key in the **Function** menu until the display shows **Function: Log output**.
4. Press the 'P' key to select the **Log output - Output medium** sub-menu.
5. Press the 'P' key again. If an output medium has yet to be chosen, the display will show the **Log output - No output medium** notification.
Navigate using the '+' or '-' key until the display shows:



6. Press the 'P' key to confirm. The display switches back to the **Log output - Output medium** menu.
7. Press the 'S' key to return to the SETUP menu **Function: Log output** menu.
8. After repeated pressing of the 'S' key, the display returns to its initial state.

Opening text logs on the computer

All text logs can be opened and printed using a text editor, a word processing program or a spreadsheet program.

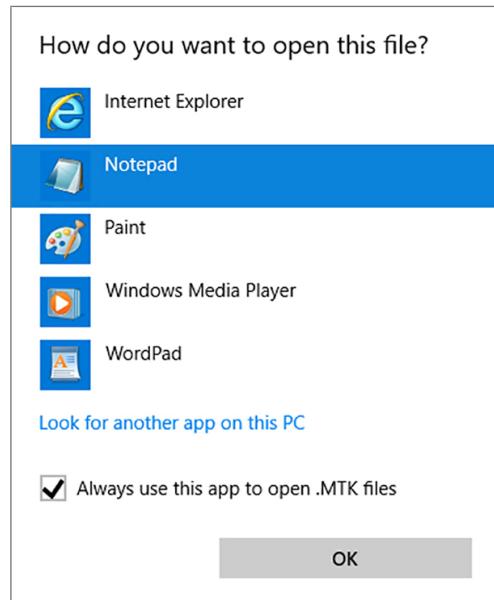
! PLEASE NOTE

Graphic logs can only be displayed with the MELAtrace documentation software.

Each text log (e.g. .PRO, .STR, .STB) must be linked with the text editor to enable the operating system of your computer to open them automatically with a text editor. The meanings of the endings are outlined in the section **Subsequent log output** [▶ page 33]. The following examples show how you can link the Windows 10 editor with a specific text log.

1. In Windows Explorer double click on the log file.
2. If the file ending is unfamiliar, Windows 10 will display the following message:
3. Select "Try an app on this PC".

4. Mark the editor and confirm with "OK".



→ You can then open files with this ending via a double-click in Windows Editor.

Alternatively, you can open all text logs with the documentation software MELAtrace.

Outputting logs immediately and automatically

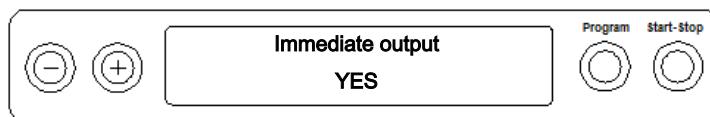
Text logs

If you want to output the associated text log automatically after the end of a program on an output medium, use the function **Immediate output YES**. This is not set in the delivery state.

The following requirements must be fulfilled in order to issue logs immediately after the end of a program:

- ✓ In the menu **Function: Log output**, immediate output is set to **YES**.
- ✓ At least one output medium must be selected (computer, e.g. log printer MELAprint 42/44).
- ✓ The activated output medium must be connected and initialised.

1. Switch on the steam sterilizer at the power switch.
2. Select the **Function** menu by pressing the '+' and '-' keys simultaneously. The display will show the message **Function: Last batch number**
3. Navigate using the '+' or '-' key until the display shows: **Function: Log output** and press the 'P' key.
4. Navigate using the '+' or '-' key until the display shows:



5. Press the 'P' key to change between **Immediate output NO / YES**.
6. Press the 'S' key to save the setting and to leave the menu. The display will show **Function: Log output**.
7. Pressing the 'S' key once again enables you to leave the menu and return to the display initial state.

! PLEASE NOTE

If immediate output is unable to issue a log, for example, because the output medium activated is not connected, a warning message will appear. MELAG recommends using the immediate log output function.

Graphic logs

For log output immediately after program end, comply with the following:

- In **Function: Log output**, **MELAnet+graphic data** must be selected as the output medium.
- The computer or another medium must be connected and initialised.

Subsequent log output

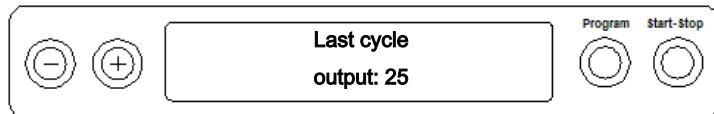
It is possible to issue logs subsequently and independently of the time of a program end. You can choose whether selected or all saved logs (up to 40) are to be output. Use the output medium connected for this task e.g. the log printer.

Printing selected logs

To print the subsequently selected logs of a particular program proceed as follows:

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously. The display shows the message **Function: Last batch number**
2. Navigate using the '+' or '-' key until the display shows: **Function: Log output** and press the 'P' key. The **Log output – Output medium** menu is displayed.
3. Navigate using the '+' or '-' key until the display shows: **Last cycle output**: no. 40 (as example no. 40).
4. Press the 'P' key. The current log number flashes.
5. To issue a log or another cycle, navigate to the desired number using the '+' or '-' keys until you have reached the desired number, e.g. 25.
6. Press the 'P' key in order to start the output of the selected program. The display shows the message **Output**.

After a successful output, the display returns to its previous setting and shows:



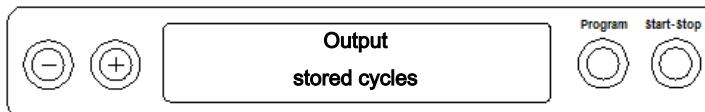
Repeat the last three steps in order to issue further logs.

7. Press the 'S' key to leave the submenu without outputting the log.
8. To exit the menu after the output has finished, press the 'S' key. The display shows the message **Function: Log output**.
9. Repeated pressing of the 'S' key enables you to leave the menu entirely and return to the display initial state.

Outputting all saved logs

Proceed as follows to output all the saved logs subsequently:

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously. The display shows the message **Function: Last batch number**
2. Navigate using the '+' or '-' key until the display shows: **Function: Log output** and press the 'P' key.
3. Navigate using the '+' or '-' key until the display shows:



4. Press the 'P' key in order to start the output of the selected program. The display will show the message during the output: **Output**.
5. If output has been performed, the display will show: **Output stored cycles**.
5. Press the 'S' key to leave the submenu without outputting the log.

! PLEASE NOTE

An abort **during** log output on the log printer is only possible through deactivation of the device using the power switch or by interrupting the power supply to the printer. When switching off the device via the power switch, wait 3 s before switching it back on.

6. Press the 'S' key to leave the menu. The display will show the message **Function: Log output**.
7. Repeated pressing of the 'S' key enables you to leave the menu entirely and return to the display initial state.

Displaying the log memory

If a printer or other output medium is connected and initialised, you can check how many logs have already been saved in the steam sterilizer log memory.

Proceed as follows:

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously. The display will show the message **Function: Last batch number**.
2. Navigate using the '+' or '-' key until the display shows **Function: Log output** and press the 'P' key.
3. Navigate using the '+' or '-' key until the display shows the number of logs saved.

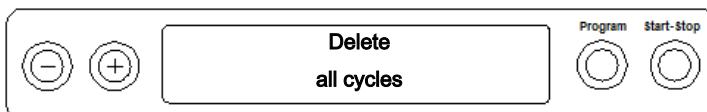


4. Press the 'S' key twice to leave the menu.

Deleting logs in the internal log memory

Delete the saved logs manually to suppress warnings, e.g. **Log memory full**, while the option **Immediate output** is set to **no**. The following example shows how to delete all the logs saved.

1. Select the **Function** menu by pressing the '+' and '-' keys simultaneously. The display will show the message **Function: Last batch number**.
2. Navigate using the '+' or '-' key until the display shows **Function: Log output** and press the 'P' key.
3. Navigate using the '+' or '-' key until the display shows:



4. Press the 'P' key to delete all logs.
5. To cancel the sub-menu without deleting, press the 'S' key.
6. Press the 'P' key to leave the menu after deletion. The display will show the message **Function: Log output**.
7. Repeated pressing of the 'S' key enables you to leave the menu entirely and return to the display initial state.

Reading logs correctly

Log type	File ending	Explanation
Text log	.PRO	Log of a completed program
Malfunction log	.STR	Log of an unsuccessfully finished program
Graphic log	.GPD	Program run displayed as a graphic curve
Standby log	.STB	Log for malfunctions in idle mode
Demo log	.DEM	Log of a simulated program run. No real sterilization will be performed!
Demo graphic log	.DEG	Simulated program run displayed as a graphic curve. No real sterilization will be performed!

Log header

The header of the program log comprises the general basic information regarding the program run. This includes e.g. date, the selected program, the daily batch number and the device type.

Program step values

The phases of the program run are recorded whilst it runs and the values for steam pressure, temperature and time (related to the program start) are recorded.

Summary

The summary states whether the program has been completed successfully. The values of the plateau time required, the sterilization temperature and the pressure (including the maximum deviation) are also displayed.

Example for a text log of a successfully completed program

----- MELAG Euroklav 29VS+				Steam sterilizer type
Program : Universal-Program 134 °C wrapped				Started program
Date : 31.08.2018				Current date
Time : 13:14:45 (start)				Time at program start
Batch number: 2				Daily batch number
SN : 201829VS+S4321				Serial number

Preheating 120.0 °C AIN6: Conductivity 0 µS/cm				Pre-heating temperature Feed water conductivity
-----				PROGRAM STEP VALUES
Program step	Press.	Temp.	Time	
	bar	°C	min	
Start	0.00	99.6	00:00	
Pre-vacuum				
Evacuation	-0.75	64.9	00:36	
Steam intake	0.00	99.7	01:13	
1.Fractionation				
Steam intake	1.00	120.5	02:01	
Press. release	0.20	104.7	02:40	
2.Fractionation				
Steam intake	1.00	120.5	03:19	
Press. release	0.20	104.7	03:57	
3.Fractionation				
Steam intake	1.00	120.5	04:36	
Press. release	0.20	104.7	05:15	
4.Fractionation				
Steam intake	1.00	120.5	05:54	
Press. release	0.20	104.7	06:33	
5.Fractionation				
Steam intake	1.00	120.5	07:11	
Press. release	0.20	104.7	07:50	
Press. build-up	2.04	134.0	09:19	
Steriliz.begin.	2.04	134.0	09:19	
Steriliz. end	2.18	135.6	14:49	
Press. release	0.50	111.4	16:11	
Flow drying				
Drying begin.	0.50	111.4	16:11	
Drying flow	0.40	109.2	16:16	
Drying pumping	1.20	123.3	16:54	
Vacuum-drying				
Drying begin.	1.20	123.3	32:26	
Drying evacuat.	-0.50	81.3	33:48	
Drying pumping	0.60	113.3	34:41	
Drying end	0.60	113.3	41:48	
End	0.00	99.6	42:13	

PROGRAM SUCCESSFULLY COMPLETED!				SUMMARY
				Control message
Temperature : 135.4 +0.3 /-0.3 °C				Median sterilization temperature with max. deviations
Pressure : 2.17 +0.03 /-0.03 bar				Median sterilization pressure with max. deviations
Steril. time : 5 min 30 s				Sterilization time maintained
Time : 13:56:58 (End)				Time upon program end

23 201804321 5.15 5.04				Information with total batch counter, factory number and device software version number

8 Function checks

Automatic functional checks

The electronic parameter control subjects the interaction of the sterilization-relevant parameters pressure, temperature and time to constant automatic monitoring. The steam sterilizer **process evaluation system** compares the process parameters during the program with each other and monitors them in terms of their threshold values. The steam sterilizer monitoring system checks the device components for their functionality and their plausible interaction. Should the parameters exceed pre-set threshold values, the steam sterilizer emits warning or malfunction messages. If necessary, it interrupts the program with appropriate information. When the program has ended successfully, the corresponding message will be shown on the display.

Manual functional checks

You can follow the program run on the display via the values displayed there. You can also use the log recorded for every program to determine its success, see [Logging](#) [▶ page 29].

Vacuum test

The test detects leaks in the steam sterilizer. This determines the leakage rate at the same time.

Perform a vacuum test in the following circumstances:

- Once a week in routine operation
- During commissioning
- Following longer operating pauses
- In the case of a corresponding malfunction (e.g. in the vacuum system)

Perform the vacuum test with the steam sterilizer in a cold and dry state as follows:

1. Switch on the device at the power switch. The display switches to its initial state.
2. Press the 'P' key until the display shows **Vacuum test**.
3. Close the door.
4. Press the 'S' key to start the vacuum test.

→ The leakage rate is shown on the display after the vacuum test has been completed. If the leakage rate is higher than 1.3 mbar, a corresponding message will appear.

The current daily batch number and **Acknow. with '+' key** is displayed. You can open the door after pressing the '+' key.

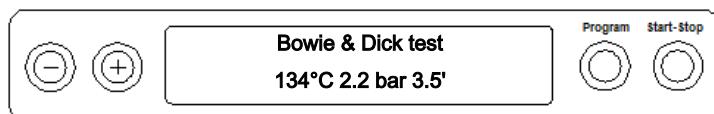
! PLEASE NOTE

If a log printer or another output medium is connected and the setting **Immediate output YES** is set, a log printout will be issued at the same time.

Bowie & Dick test

The **Bowie & Dick test** serves as proof of steam penetration of **porous materials** such as e.g. textiles.

Specialist stockists provide various test systems for the Bowie & Dick test. Perform the test according to the test system manufacturer information.



How to start the Bowie & Dick test program:

1. Switch on the device at the power switch.
2. Select the Bowie & Dick test by pressing the 'P' key repeatedly.
3. Press the 'S' key to start the Bowie & Dick test.

Following a successful test program, the current batch number of the day is displayed, alternating with **Acknow.** with **'+'** **key**. You can open the door after pressing the '+' key.

PLEASE NOTE

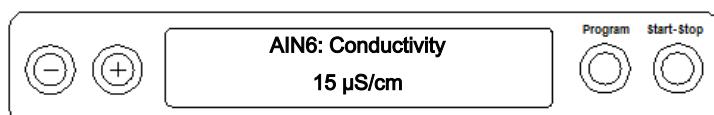
If a log printer or another output medium is connected and the setting **Immediate output YES** is set, a log printout will be issued at the same time.

Evaluation of the indicator following the colour change

Depending on the manufacturer batch, indicators often exhibit differing intensities in the colour change resulting from different lengths of storage or other influences. Of crucial importance for evaluating the Bowie & Dick test is not the strength of contrast in the colour change on the test sheet, but the uniformity of the colour change on the indicator. If the indicator indicates an equal distribution of colour change, the de-aeration of the sterilization chamber is without fault. If the indicators are uncoloured or exhibit less colour in the centre in comparison to the end, de-aeration was insufficient. In this case, contact the authorised technician.

Checking the quality of the feed water

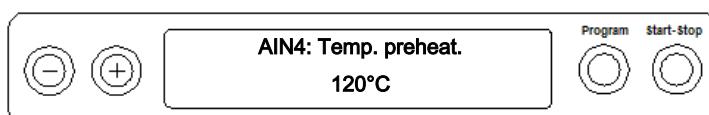
You can access the water quality on the display at any time during a current program when the steam sterilizer is switched on.



- ▶ To do so, hold the '-' key depressed until the display shows **Conductivity**.
 - The conductivity is displayed in $\mu\text{S}/\text{cm}$.
 - As soon as you have released the '-' key, the display returns to its previous state (e.g. initial state).

Pre-heating temperature of the sterilization chamber

- ▶ Press the '-' key twice. When pressing the first time, press shortly. When pressing the second time, hold the key depressed.



- The conductivity display disappears and the preheating temperature in the chamber will be displayed.

9 Maintenance

Servicing intervals

Interval	Measure	Device component
Daily	Check for soiling, deposits or damage	Sterilization chamber including door gasket and chamber seal face, door lock, mount for the load
Weekly	Cleaning	Sterilization chamber including door gasket and chamber seal face, door lock, mount for the load
After 24 months or 1000 cycles	Maintenance	By the authorized customer services working in accordance with the maintenance instructions
As required	Cleaning the surfaces	Housing parts

Cleaning

NOTICE

Warning of material damage from incorrect cleaning

Inappropriately performed cleaning can lead to the scratching of and damage to surfaces as well as the development of leaks in sealing faces. This also favours the development of soiling deposits and **corrosion** in the **sterilization chamber**.

- Comply with all information regarding cleaning of the parts affected.
- Do not use any hard objects for cleaning such as a metal saucepan cleaner or a wire brush.

Sterilization chamber, door gasket, mount, trays

To maintain the value of your device and to avoid persistent contamination and deposits, MELAG recommends weekly cleaning of the surfaces. Use the Chamber Protect chamber cleaning set or, if not available, a neutral liquid cleaner or spirit.

PLEASE NOTE: Note the instructions for use of the cleaning agent.

The following must be fulfilled or present:

- ✓ Chamber Protect (if not available: neutral liquid cleaner or spirits)
- ✓ The door is open.
- ✓ Trays or sterile containers and the associated mount have been removed from the sterilization chamber.

1. Apply the cleaning agent on a lint-free cloth.
2. Use a lint-free cloth to uniformly spread the cleaning agent on the surfaces to be cleaned.
3. Allow the cleaning fluid to act and evaporate for a sufficient time. This may take a few minutes.
4. Wet a new lint-free cloth with plenty of demineralised water.
5. **NOTICE! Warning of material damage. Residues of cleaning agents can ignite or cause deposits on the instruments. Wipe down the cleaned surfaces thoroughly.**
After wringing out the cloth, repeat this process if necessary.
6. Allow the cleaned surfaces to dry completely. This may take a few minutes.
7. Wipe the cleaned surfaces with a dry, lint-free microfibre cloth.

Housing parts

Where necessary, clean the housing parts with a neutral fluid cleaner or spirit.

Comply with the following specifications when disinfecting the housing parts:

- Use wipe disinfectants and not spray disinfectants. This prevents disinfectant from getting into inaccessible places or ventilation slots.
- Only use alcohol-based surface disinfectants (ethanol or isopropanol) or alcohol-free disinfectants based on quaternary ammonium compounds.
- Do not use disinfectants containing secondary and tertiary alkylamines or butanone.

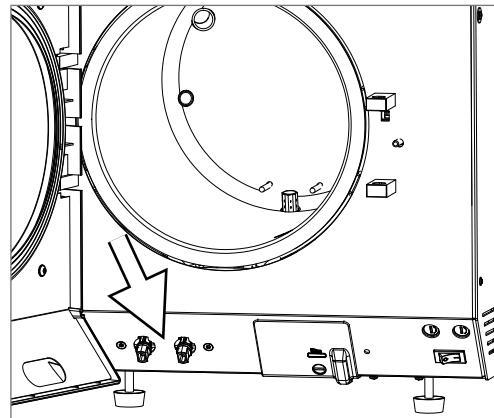
Internal storage tank

Should you use the internal storage tank for the feed water supply, perform regular checks and cleaning.

Interval	Measure
Each time you fill up	Check the storage tank for soiling. If necessary, clean the storage tank before filling.
Weekly	Replace the feed water completely.
Every 2 weeks	Clean the drain side of the storage tank.

Empty the storage tank

1. Open the device door.
2. Connect the drain hose to the bleed valve for feed water or wastewater. Turn the bleed valve with the drain hose anti-clockwise as far as it will go.



3. Discharge the water into a container with min. volume of 5 l.
4. Turn the bleed valve with the drain hose anti-clockwise as far as it will go.
 - The bleed valve is closed.
5. Remove the drain hose by pulling it lightly backwards away from the device.

Clean the supply and wastewater side

- ✓ The device has been completely cooled.

1. Remove the tank lid and the feed funnel.
2. Clean the feed water side (right) and wastewater side (left) with a lint-free cloth and fresh feed water.
3. Return the filling funnel and the tank lid.

Avoiding staining

Only proper cleaning of the instruments prior to sterilization enables you to avoid residue from being released from the load under steam pressure during sterilization. Loosened dirt residue can clog the filter, fittings and valves of the device and deposit themselves on the instruments and in the sterilization chamber as deposits and stains.

All steam-conducting parts of the device consist of non-rusting material. This rules out the development of rust caused by the device. Any rust which develops is always extraneous rust.

Incorrect instrument reprocessing can result in the accretion of rust even on stainless steel instruments of leading manufacturers. Often, a single instrument which drops rust can suffice to cause the development of rust on other instruments or in the device. Remove foreign rust from the instruments using chlorine-free stainless steel cleaning fluid (see [Cleaning](#) [▶ page 38]) or send the damaged instruments to the manufacturer.

The extent of stain accretion on the instruments is also dependant on the [feed water](#) used for steam generation.

Replacing the door gasket

The door gasket may not be greased or oiled. It should be kept clean and dry. If the door gasket becomes worn or loses form, it must be replaced. Otherwise, this could result in leaks which will enable steam egress, or can cause too high a leakage rate in the vacuum test. The door gasket is only inserted in the groove of the round blank and can be changed as follows:

1. Open the steam sterilizer door and remove the old door gasket.



2. Insert the door gasket in the groove of the round blank.



⚠ PLEASE NOTE

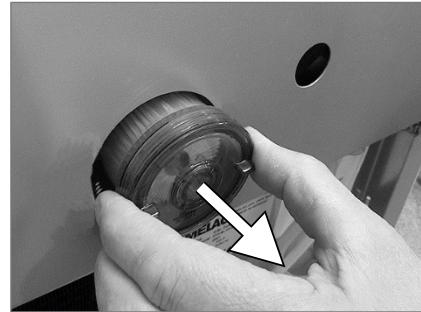
Make sure that the broad seal face faces the sterilization chamber when inserting. The door can only be shut correctly and the sterilization chamber sealed, if the door gasket sits correctly in the groove.

Replacing or sterilizing the sterile filter

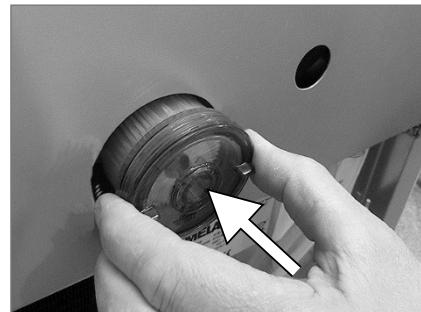
The sterile filter must be replaced regularly within the scope of the maintenance. In the event of malfunctions and the fault message F32: **Power failure/Sterilize sterile filter** replace or sterilize the sterile filter.

Replacing the sterile filter

1. Remove the sterile filter by turning and pulling it from the holding sockets simultaneously.

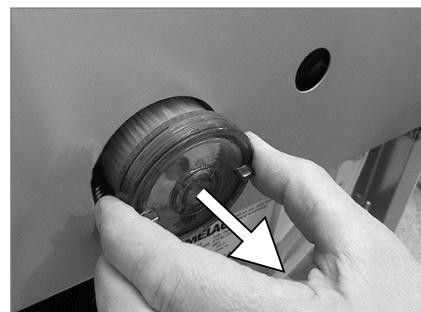


2. Replace the sterile filter **or** sterilize the current sterile filter, see [Sterilizing the sterile filter](#) [▶ page 41].
3. Exert a little pressure on the sterile filter and turn to insert it into the holding sockets.



Sterilizing the sterile filter

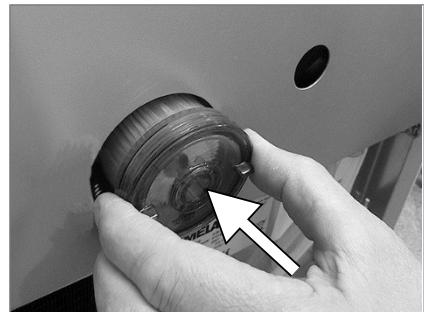
1. Remove the sterile filter by turning and pulling it from the holding sockets simultaneously.



2. Slide a into the steam sterilizer and place the sterile filter vertically on the tray. Ensure that the sterile filter does not fall over, otherwise the condensate will not be able to drain away correctly.



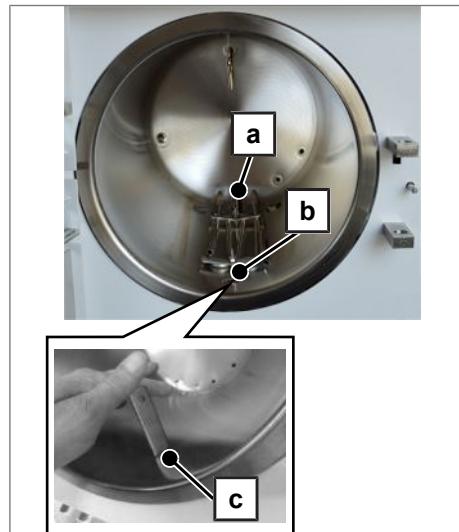
3. Start the **Gentle-Program**.
4. Remove the sterile filter from the device after the program end and allow it to cool for min. 15 min.
5. Exert a little pressure on the sterile filter and turn to insert it into the holding sockets.



Cleaning the filter in the sterilization chamber

1. Unscrew the two fixing screws on the metal cover in the sterilization chamber (using e.g. a coin) and remove the metal cover.
2. Unscrew the "condensate return" (pos. a) and "vacuum / flow" (pos. b) filters anti-clockwise out of the opening to check and clean.

Use the spanner included in the scope of delivery (pos. c) to unscrew the "vacuum / flow" filter.



3. Rinse the filter (pos. a and b) for cleaning with water.
4. Screw in the "condensate return" filter (pos. a) and the "vacuum / flow" filter (pos. b) clockwise into the opening.
5. Fasten the metal cover in the sterilization chamber with the two fixing screws.

Maintenance

Comply with the following for safe handling:

- Maintain the specified maintenance intervals. Continuing operation beyond the maintenance interval can result in malfunctions in the device.
- Have maintenance performed only by trained and authorised technicians using the original MELAG maintenance set.
- If components that are not included in the maintenance set have to be replaced during maintenance, only original spare parts from MELAG may be used for the replacement.

Regular maintenance is vital to ensure reliable operation and value retention of the steam sterilizer. All function and safety-relevant components and electrical units must be checked during maintenance and replaced where necessary. Maintenance is performed in accordance with the maintenance instructions pertinent to this steam sterilizer.

Arrange for regular maintenance in 24 month intervals or after 1000 program cycles. The steam sterilizer will issue a maintenance message at the relevant time.

10 Pause times

Frequency of sterilization

Pause times between individual programs are not necessary. After the end/abort of the drying time and removal of the **►sterile material**, you can load the steam sterilizer again and start a new program.

Operating pauses

Depending on the duration of the operating pauses, the following measures must be maintained:

Duration of the operating pause	Measure
Short pauses between two sterilization processes	<ul style="list-style-type: none">• Keep the door closed to save energy
Pauses which last longer than an hour	<ul style="list-style-type: none">• Switch off the steam sterilizer
Longer pauses e.g. over night or the weekend	<ul style="list-style-type: none">• Switch off the steam sterilizer• Leave the door ajar to prevent premature wear and the sticking of the door gasket• If present, shut off the water inflow of the water treatment unit
Longer than two weeks	<ul style="list-style-type: none">• Switch off the steam sterilizer• Leave the door ajar to prevent premature wear and the sticking of the door gasket• If present, shut off the water inflow of the water treatment unit <p>Upon re-commissioning:</p> <ul style="list-style-type: none">• Perform a vacuum test• After a successful vacuum test, perform an empty sterilization run in Quick-Program S

After pauses, perform the checks described in chapter [Function checks](#) [► page 36] depending on the length of pause.

Decommissioning

When decommissioning the steam sterilizer for a long pause (e.g. due to holiday or planned transport), proceed as follows:

1. Empty the storage tank, see [Internal storage tank](#) [► page 39].
2. Switch off the device at the power switch.
3. Disconnect the power plug from the socket.
4. Clean the supply tank, see [Internal storage tank](#) [► page 39].
5. Close the water inflow if you are using a water treatment unit.

Transport

Transport within the practice

NOTICE

Failure to observe these provisions can result in damage to the device and malfunction.

Comply with the following provisions when transporting within a room or the practice:

- When using a water treatment unit and/or an outlet hose, close the water inflow and remove the hose connections on the rear of the device.
- Should you wish to leave the mount and trays or sterilization containers in the sterilization chamber during transport, protect the surface of the round blank. To do so, place e.g. some foam or bubble wrap between the round blank and mount.
- Close the device door before moving the device.

Transport over long distances

NOTICE**Warning of material damage**

Damage to the housing and the device interior as a result of using unsuitable transport packaging.

- Only transport the device in its original packaging or other suitable packaging.

Comply with the following provisions when transporting the steam sterilizer (e.g. a move or dispatch):

- Before transporting the steam sterilizer over long distances, before dispatch or given the danger of frost, an authorized technician must prepare the device in accordance with the instructions and empty the storage tank entirely.

Recommissioning after relocation

When recommissioning after changing the location of the device, proceed as for initial commissioning, see Technical manual.

11 Malfunctions

Troubleshooting online

All messages with current descriptions can be found in the Troubleshooting portal on the MELAG website (<https://www.melag.com/en/service/troubleshooting>).



Warnings

Warnings are not malfunction messages. They help to ensure malfunction-free operation and to recognise undesirable situations. Comply with these warnings early in order to avoid malfunctions.

Malfunction messages

Malfunction messages are issued on the display with an event number. This number serves identification purposes. Malfunction messages are issued when it is not possible to ensure safe operation or safety of sterilization. These can appear on the display shortly after activating the steam sterilizer or during a program run.

If a malfunction occurs during a program run, the program will be aborted.

⚠ WARNING

Warning of contamination

If a program is terminated before drying starts, the load is **not** sterile.

- Re-wrap the load if necessary.
- Repeat the sterilization of the load.

Before contacting customer services

Ensure that you have complied with all instructions relating to a warning or malfunction message issued by the display of the device. The following table contains a summary of the most important events. The events contain possible causes and the corresponding operator information.

Should the following table not contain the relevant event, or your efforts do not redress the problem, you can contact your nearest stockist or a local authorised MELAG customer service provider. Please have the serial number of your device and a detailed description of the message ready.

Warnings

Event	Possible causes	What you can do
Notice: no feed water / refill feed water – start not possible	There is insufficient feed water in the internal storage tank.	Check the water level of the feed water in the internal storage tank and refill with feed water if necessary.
Notice: no feed water/ check the feed water inflow	<p>When using the internal storage tank:</p> <p>The warning message will be displayed after a program start. The installed flow monitor does not close.</p> <p>When using a MELAG water treatment unit:</p> <p>The warning message will be displayed after a program start. The installed flow monitor does not close.</p>	<p>Upon repeated incidence, contact an authorised customer services / stockist technician.</p> <p>MELAdem 40/53/53 C: Check the water treatment unit and open the inflow to the system if necessary. Upon repeated incidence, contact an authorised customer services / stockist technician.</p> <p>MELAdem 47: Check the water treatment unit and if necessary, open the inflow to the system. Perform a new start with an empty pressure storage after approx. 1 hour. Upon repeated incidence, contact an authorised customer services / stockist technician.</p> <p>PLEASE NOTE: This message can be issued following commissioning/recommissioning, as the pipe system has not been filled completely. Repeat the start.</p>
Poor feed water/replace the cartridge or module	<p>The conductivity of the feed water is too high. Conductivity $\geq 40 \mu\text{S}/\text{cm}$</p> <p>When using a MELAG water treatment unit:</p> <p>The mixed-bed resin is exhausted.</p>	<p>Start through repeated pressing of the 'S' key still possible.</p> <p>MELAdem 40: Replace the mixed-bed resin (art. no. ME61026), see the user manual of the water treatment unit.</p>
	<p>The mixed-bed resin in the ion exchanger (3rd cartridge) is exhausted.</p> <p>When using a different water treatment unit:</p> <p>The mixed-bed resin in the reverse osmosis unit is exhausted.</p>	<p>MELAdem 47: Replace the mixed-bed resin (art. no. ME37470), see the user manual of the water treatment unit and check the water treatment unit.</p> <p>Following repeated incidence, arrange for maintenance to be performed by the authorised customer services / stockist technician. The pre-filter and activated carbon filter may require changing.</p> <p>Replace the module / resin cartridge in accordance with the manufacturer's user manual. Maintenance is required following repeated incidence.</p> <p>PLEASE NOTE: Perform a program start after completing the work outlined above. This warning can be issued upon the initial start after maintenance of the water treatment unit, as the inlet hose / the measurement cell have not been completely rinsed with fresh water.</p>

Event	Possible causes	What you can do
Feed water quality insufficient / Start not possible	Feed water conductivity too high. Conductivity $\geq 65 \mu\text{S}/\text{cm}$	Start no longer possible. See event: Feed water quality bad (Replace cartridge/module).
Please wait / Preheating chamber	This message appears during the program start phase. The steam sterilizer has not yet reached the starting temperature.	The steam sterilizer starts automatically after the starting temperature has been reached.
Notice: change the sterile filter	The min./max. pressure is exceeded/undercut during air drying; the sterile filter is soiled or torn.	Replace the sterile filter. PLEASE NOTE: The message is issued at the end of the program and in the last line of the log output.
Output medium is not ready	The steam sterilizer is operating without an output medium, but one has been registered. The output medium has not been connected properly. The electricity supply to the printer has been interrupted. The printer is "offline".	Working in the Log output menu, set the option No output medium . Check that the data cable has been connected to the steam sterilizer and output medium correctly Make sure that the power supply is connected. MELAprint 42/44: The red LED "P" on the printer must be red. MELAprint 80: The LED on the printer must be green. Set the printer to "online". MELAprint 42/44: Press the 'SEL' key. The 'SEL' LED must be green. MELAprint 80: The LED on the printer must be green.
Log memory full	The internal log memory of the device is full (max. 40 logs possible) An output medium has been registered and the option Immediate output NO has been set in the Log output menu.	The notification is displayed upon program start. Repeated pressing of the 'S' key removes the message and the program starts. The oldest log will be deleted in the process. 1. Set the steam sterilizer to Immediate output YES see Outputting logs immediately and automatically [▶ page 32]. 2. Delete the internal device memory, see Deleting logs in the internal log memory [▶ page 34]. If necessary, output all previously saved logs, see Subsequent log output [▶ page 33]. 3. Working in the Log output menu, log off the output medium and set the No output medium option.
Carry out maintenance	The maintenance message is activated. The device has reached the set number of batches or the running time of 24 months.	The message is displayed upon every program start. Repeated pressing of the 'S' key removes the message and the program starts. Retain the message: Press the 'S' key twice to start. Arrange for maintenance by the authorized customer services/stockist technician. PLEASE NOTE: The maintenance counter is reset by the customer services.

Event	Possible causes	What you can do
Vacuum test unsuccessful	The leakage rate determined during the vacuum test lies over the maximum permissible value of 1.3 mbar.	1. Check the door seal and the chamber flange for soiling and clean if necessary. 2. Check the door seal for damage and change if necessary, see Replacing the door gasket [▶ page 40]. 3. Repeat the vacuum test with a cold device, see Vacuum test [▶ page 36].
Leakage rate: > 1.3 mbar	The door seal and/or chamber flange is soiled.	Check the incline of the steam sterilizer to the rear. Complete condensate drainage from the chamber is only possible with a sufficient rearwards incline. Starting from a level position, extend the foremost device feet for the Euroklav 23 VS+ by 5 or 3 rotations for the Euroklav 29 VS+.
	The "vacuum / flow" filter is soiled.	Unscrew the "vacuum / flow" chamber filter (in the fore area of the sterilization chamber) and check for soiling. Clean the filter if necessary, (see Cleaning the filter in the sterilization chamber [▶ page 42]).
	The sterilization chamber is too hot.	Allow the steam sterilizer to cool and rub the sterilization chamber dry with a non-fuzzing cloth. PLEASE NOTE: The sterilization chamber must be dry and cold to ensure a successful vacuum test.
Notice! Battery empty	Monitoring of the internal battery voltage has returned a low value.	Have the battery replaced by an authorised technician.

Fault messages

Event	Possible causes	What you can do
F01	The door seal and/or the seal face on the sterilization chamber is soiled or the door seal is defective.	Check the door seal and the seal face on the sterilization chamber for soiling and foreign bodies and clean them if necessary. Check the door seal for defects and replace if necessary, see Replacing the door gasket [▶ page 40].
	The door seal was not inserted correctly.	Check whether the door seal has been inserted correctly, see Replacing the door gasket [▶ page 40]. Insert the new door seal in the groove in such a way that the wider seal face points towards the side of the sterilization chamber.
	The incline to the steam sterilizer is too flat.	Check the incline of the steam sterilizer to the rear. Complete condensate drainage from the chamber is only possible with a sufficient rearwards incline. Starting from a level position, extend the foremost device feet for the Euroklav 23 VS+ by 5 or 3 rotations for the Euroklav 29 VS+.
	The pressure release of the sterilization chamber is blocked.	Unscrew the "vacuum/flow" chamber filter (in the fore area of the sterilization chamber) and check for soiling. Clean the filter if necessary, (see Cleaning the filter in the sterilization chamber [▶ page 42]).
	The surrounding temperature of the steam sterilizer is too hot.	The ambient temperature must amount to < 40 °C. We recommend a maximum temperature of 25 °C.
	The minimum clearance to the surrounding surfaces has not been maintained.	Maintain a minimum clearance to the surrounding surfaces (see information in the technical manual). The device may only be installed if sufficient ventilation can be guaranteed.
F02	The outlet opening of the evaporator coil in the left-hand chamber of the storage tank (wastewater side) is impeded.	Check the outlet opening of the evaporator coil as follows: 1. Remove the tank lid from the internal storage tank. 2. Remove the filling funnel. 3. Check whether the outlet opening of the evaporator coil at the front underneath the tank lid is blocked or the rubber panel obscures the opening.
	The overheat protection has tripped.	Press the overheat protection reset button on the fore side of the steam sterilizer at the bottom right-hand side (behind the panel) back in.
	The steam sterilizer is overloaded.	Comply with the maximum permissible load quantities, see Loading the steam sterilizer [▶ page 22].
	The incline of the steam sterilizer is incorrect.	Check the incline of the steam sterilizer to the rear. Only a correct incline guarantees optimal metering of the water volume. Starting from a level position, extend the foremost device feet for the Euroklav 23 VS+ by 5 or 3 rotations for the Euroklav 29 VS+.
	The mains voltage is too low, poor building voltage supply (e.g. undersized installation, defective socket, multiple devices on a single socket/fuse) so that the steam generator cannot heat up.	Check the building-side socket / test the steam sterilizer using a different socket or circuit.

Event	Possible causes	What you can do
F04	The "condensate return" filter is soiled.	<ol style="list-style-type: none"> Unscrew the two fixing screws on the metal cover in the sterilization chamber with an object e.g. a coin. Remove the metal cover. Unscrew the "condensate return" filter (in the rear of the sterilization chamber). Check the "condensate return" filter for soiling and clean it if necessary, see Cleaning the filter in the sterilization chamber [▶ page 42].
	The outlet opening of the evaporator coil in the drain water side of the storage tank (left) is impeded.	<p>Check the outlet opening of the evaporator coil as follows:</p> <ol style="list-style-type: none"> Remove the tank lid from the internal storage tank. Remove the filling funnel. Check whether the outlet opening of the evaporator coil at the front underneath the tank lid is blocked or the rubber panel obscures the opening.
F08	The internal device time monitoring is defective.	<p>Check the building-side socket / test the steam sterilizer using a different socket or circuit. Upon repeated incidence, arrange for an electrician to check the electricity supply for electromagnetic disruption.</p>
F09	The door has not been closed correctly upon program start.	<p>Close the door correctly and start the program again.</p> <p>PLEASE NOTE: To shut the door correctly, press it against the steam sterilizer lightly and slide the slide locking grip downwards to its fullest extent.</p>
	An attempt was made to open the door during a program run.	<p>Do not attempt to open the door during a program run.</p>
F10	The overheat protection of the tubular heating element has triggered.	<p>Allow the steam sterilizer to cool for approx. 2 min and then restart the program.</p> <p>PLEASE NOTE: This notification can be issued if a program is started immediately after a malfunction or a program abort.</p>
	The incline of the steam sterilizer is incorrect.	<p>Check the incline of the steam sterilizer to the rear. Only a correct incline guarantees optimal metering of the water volume.</p> <p>Starting from a level position, extend the foremost device feet for the Euroklav 23 VS+ by 5 or 3 rotations for the Euroklav 29 VS+.</p>
F12	The door has not been closed correctly.	<p>To shut the door correctly, press it against the steam sterilizer lightly and slide the slide locking grip downwards to its fullest extent.</p>
	The locking pin for the door is stiff.	<p>Open the door, switch off the steam sterilizer and press in the locking pin by hand. The pin must be free-moving. If necessary, clean the locking pin.</p>
F18	Malfunction on the specified sensor input	<p>Upon repeated occurrence, please inform an authorised technician.</p>
	With "Malfunction 18 Sensor: 6 Input: 6" an excessively high conductivity of the feed water supply can be measured.	<p>Check whether the water used as feed water actually corresponds to the required quality or e.g. tap water has been used. The feed water must fulfil the quality requirements of EN 13060, Appendix C. If tap water has been used, restart the steam sterilizer two to three times so as to flush out the tap water from the system.</p>
F21	The monitoring time of the preheating was exceeded.	<p>Upon repeated incidence, contact an authorized customer services/stockist technician.</p>
F22	The maximum preheating temperature has been exceeded.	<p>Upon repeated incidence, contact an authorized customer services/stockist technician.</p>

Event	Possible causes	What you can do
F23	The pressure release of the sterilization chamber is blocked.	Unscrew the "vacuum / flow" chamber filter (in the fore area of the sterilization chamber) and check for soiling. Clean the filter if necessary (see Cleaning the filter in the sterilization chamber [▶ page 42]).
	The outlet opening of the evaporator coil in the left-hand chamber of the storage tank (wastewater side) is impeded.	Check the outlet of the evaporator coil as follows: 1. Remove the tank lid from the internal storage tank. 2. Remove the filling funnel. 3. Check whether the outlet opening of the evaporator coil at the front underneath the tank lid is blocked.
F26	The internal computer signal processing has been interrupted.	Arrange for an inspection of the building-side installation (e.g. automatic circuit breaker) and test the steam sterilizer at another socket or on another circuit. Upon repeated incidence, contact an authorized customer services/stockist technician.
F27	The max. permissible temperature difference has been exceeded.	Arrange for an inspection of the building-side installation (e.g. automatic circuit breaker) and test the steam sterilizer at another socket or on another circuit. Upon repeated incidence, contact an authorized customer services/stockist technician.
F29	Insufficient battery voltage in the device.	Arrange for the battery to be replaced by an authorized customer services/stockist technician. 1. Acknowledge the malfunction message and then reset the date and time, see Setting the date and time [▶ page 20]. 2. Start the program again.
F31	During the vacuum test, the the permissible maximum pressure was exceeded after the evacuation pressure had been achieved (serious leak). The sterilization chamber is too hot or too damp.	Allow the steam sterilizer to cool and rub the sterilization chamber dry with a non-fuzzing cloth. PLEASE NOTE: The sterilization chamber must be dry and cold to ensure a successful vacuum test.
	The door seal and/or the seal face on the sterilization chamber is soiled or the door seal is defective.	Check the door seal and the seal face on the sterilization chamber for soiling and foreign bodies and clean them if necessary. Check the door seal for defects and replace if necessary. See Replacing the door gasket [▶ page 40].
	The door seal was not inserted correctly.	Check whether the door seal has been inserted correctly. See Replacing the door gasket [▶ page 40]. Insert the new door seal in the groove in such a way that the wider seal face points towards the side of the sterilization chamber.
F32	The steam sterilizer was switched off at the power switch during a program run. The power plug has been disconnected or has not been connected correctly in the socket.	Replace or sterilize the sterile filter as follows: 1. Remove the sterile filter from the rear panel of the steam sterilizer and sterilize it in the Gentle-Program without continuing loading. 2. Return the sterile filter to the rear panel. Never switch off the steam sterilizer at the power switch during a program run. Always abort a program with the 'Start-Stop' key.
	Power failure in the building supply.	Check whether the power plug is connected, the power cable has suffered damage, or a loose contact or loose plug connections is the cause. Plug the power plug back into the mains socket.
		Arrange for an inspection of the building-side installation (e.g. automatic circuit breaker) and test the steam sterilizer at another socket or on another circuit.

Event	Possible causes	What you can do
F33	The control pressure has not been achieved. The steam sterilizer is overloaded.	Upon repeated incidence, contact an authorized customer services/stockist technician.
F35	The sterilization temperature on temperature sensor 1 was exceeded.	Upon repeated incidence, contact an authorized customer services/stockist technician.
F36	The required chamber pressure was undercut during sterilization. The steam sterilizer may be overloaded.	Comply with the maximum permissible load quantities, see Loading the steam sterilizer [▶ page 22]. If necessary, perform a vacuum test, see Vacuum test [▶ page 36].
	The door seal and/or the seal face on the sterilization chamber is soiled or the door seal is defective.	Check the door seal and the seal face on the sterilization chamber for soiling and foreign bodies and clean them if necessary. Check the door seal for defects and replace if necessary. See Replacing the door gasket [▶ page 40].
	The door seal was not inserted correctly.	Check whether the door seal has been inserted correctly. See Replacing the door gasket [▶ page 40]. Insert the new door seal in the groove in such a way that the wider seal face points towards the side of the sterilization chamber.
F37	The max. permissible sterilization pressure has been exceeded.	Upon repeated incidence, contact an authorized customer services/stockist technician.
F38	The max. permissible temperature difference on temperature sensor 1 has been exceeded.	Upon repeated incidence, contact an authorized customer services/stockist technician.
F39	The internal memory (EEPROM) has suffered data inconsistency or data loss.	<ol style="list-style-type: none"> 1. Acknowledge the malfunction message and if necessary, reset the date and time, see Setting the date and time [▶ page 20]. 2. Start the program again.
F41	see event F23	
F42	The door seal and/or the seal face on the sterilization chamber is soiled or the door seal is defective.	Check the door seal and the seal face on the sterilization chamber for soiling and foreign bodies and clean them if necessary. Check the door seal for defects and replace if necessary, see Replacing the door gasket [▶ page 40].
	The door seal was not inserted correctly.	Check whether the door seal has been inserted correctly, (see Replacing the door gasket [▶ page 40]). Insert the new door seal in the groove in such a way that the wider seal face points towards the side of the sterilization chamber.
	The incline to the steam sterilizer is too flat.	Check the incline of the steam sterilizer to the rear. Complete condensate drainage from the chamber is only possible with a sufficient rearwards incline. Starting from a level position, extend the foremost device feet for the Euroklav 23 VS+ by 5 or 3 rotations for the Euroklav 29 VS+.
	The sterile filter is soiled.	Remove the sterile filter from the rear panel of the steam sterilizer. Check the sterile filter for soiling and perform an empty sterilization run without a sterile filter. If the empty sterilization run is successful, replace the sterile filter (see Replacing or sterilizing the sterile filter [▶ page 41]).
F48	Parameter malfunction	Switch off the steam sterilizer and back on again and then restart the program. Upon repeated incidence, contact an authorized customer services/stockist technician.

Event	Possible causes	What you can do
F51	The sterilization temperature on temperature sensor 2 was undercut. The steam sterilizer may be overloaded.	Comply with the maximum permissible load quantities, see Loading the steam sterilizer [▶ page 22]. If necessary, perform a vacuum test, see Vacuum test [▶ page 36].
	The door seal and/or the seal face on the sterilization chamber is soiled or the door seal is defective.	Check the door seal and the seal face on the sterilization chamber for soiling and foreign bodies and clean them if necessary. Check the door seal for defects and replace if necessary. See Replacing the door gasket [▶ page 40].
	The door seal was not inserted correctly.	Check whether the door seal has been inserted correctly. See Replacing the door gasket [▶ page 40]. Insert the new door seal in the groove in such a way that the wider seal face points towards the side of the sterilization chamber.
F52	The sterilization temperature on temperature sensor 2 was exceeded.	If necessary, perform a vacuum test, see Vacuum test [▶ page 36]. Upon repeated incidence, contact an authorized customer services/stockist technician.
F53	The max. permissible temperature difference on temperature sensor 2 has been exceeded.	Upon repeated incidence, contact an authorized customer services/stockist technician.

Opening the door in an emergency following a power outage

⚠ WARNING

The steam sterilizer must be completely pressure free.

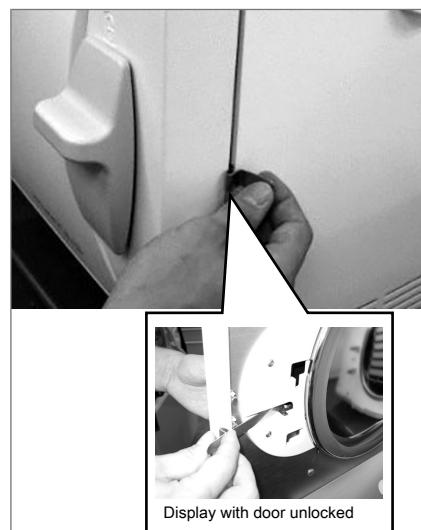
Failure to observe this provision can result in scalding/injury.

- No steam may be permitted to leave from between the sterile filter and the rear panel of the steam sterilizer.
- The slide locking grip must be easy to actuate.
- It must be possible to push the door approx. 2 mm to the rear with light pressure.
- It is imperative that you allow the steam sterilizer to cool. Metal parts such as the door and sterilization chamber can be hot.

If the door cannot be opened, e.g. due to a power failure, please proceed as follows, observing the safety information provided above:

1. Switch off the steam sterilizer at the mains and remove the plug from the socket.
2. Position long side of the lever between the door and the side wall of the steam sterilizer. The curve points forwards and the lever is at the level of the slide locking grip.

If the lever is in the guide, pull it forwards with your right hand. Push the slide locking grip upwards with your other hand.



3. Open the door.

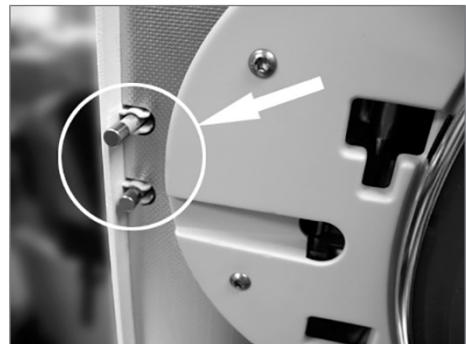


Replacing the device fuses

If the device fuses have tripped, proceed as follows to replace them:

1. Switch off the steam sterilizer at the mains and remove the plug from the socket.
2. Open the door manually, see [Emergency door opening in case of power failure](#) [▶ page 54].
3. Unscrew and remove both caps on the fuse holder on the lower front of the steam sterilizer with a screwdriver or coin.

Two replacement fuses are mounted on the inside of the door (see marking).



4. Remove the defective fuses and insert the new fuses securely in their holder.



5. Screw the cap of the fuse holder to the lower front of the steam sterilizer.
6. Reconnect the steam sterilizer plug to the socket and switch on the steam sterilizer at the power switch.

Should this trigger repeatedly, inform the authorised customer services / stockist technician.

12 Technical data

Device type	Euroklav 23 VS+	Euroklav 29 VS+
Device dimensions (H x W x D)	49 x 42.5 x 70 cm	49 x 42.5 x 62 cm
Empty weight	45 kg	42 kg
Operating weight ¹⁾	56 kg	52 kg
Sterilization chamber		
Diameter	25 cm	
Depth	45 cm	35 cm
Volume	22.6 l	17 l
Electrical connection		
Power supply	220-240 V, 50/60 Hz	
Max. voltage range	207-253 V	
Electrical power	2300 W	2100 W
Building fuse protection	separate power circuit with 16 A fuse, 30 mA RCD protection	
Overvoltage category (in accordance with EN 61010-1)	transient overvoltages up to the values of overvoltage category II	
Degree of air pollution (in accordance with EN 61010-1)	category 2	
Length of the power cable	1.35 m	
Ambient conditions		
Installation location	interior of a building	
Noise emission	64 dB(A)	
Waste heat (with max. load)	0.9 kWh	0.8 kWh
Ambient temperature	5-40 °C (ideal range 16-26 °C)	
Relative humidity	max. 80 % at temperatures of up to 31 °C, max. 50 % at 40 °C (decreasing in linear fashion in-between)	
Degree of protection (in accordance with IEC 60529)	IP20	
Max. altitude	2000 m	
Feed water connection ¹⁾		
Water temperature	5-35 °C	
Water quality	distilled or demineralized feed water in accordance with EN 13060, Appendix C (with central demineralization system max. conductivity 5 µS/cm)	
Recommended flow pressure	1.5 bar at 3 l/min	
Min. water pressure (static)	2 bar	
Max. water pressure (static)	10 bar	
Max. water consumption	700 ml	600 ml
Min. filling volume (internal storage tank, feed water side)	1 l	
Volume (internal storage tank, feed water side)	4 l (approx. 7 cycles)	
Wastewater connection		
Max. water temperature	70 °C ²⁾	
Volume (internal storage tank, waste water side)	3 l	

¹⁾ When using a water treatment unit.

²⁾ Optional: automatically via the one-way drain with the MELAG upgrade kit for the tank drain

13 Accessories and spare parts

All listed articles and an overview of further accessories are available from your stockist.

Category	Article	Art. no.	
		23 VS+	29 VS+
Holders	Chamber depth 45 cm	Chamber depth 35 cm	
	Mount A Plus for max. 5 trays or 3 MELAstore Box 100	ME82630	ME82620
Sterilization container with single-use paper filters in accordance with EN 868-8 (depth x width x height)	Mount D for max. 4 trays or 2 high sterilization containers (23M/28M) or 2 MELAstore Box 200	ME46840	
	15K (18 x 12 x 4.5 cm)	ME01151	
	15M (35 x 12 x 4.5 cm)	ME01152	--
	15G (35 x 12 x 8 cm)	ME01153	--
	17K (20 x 14 x 5 cm)	ME01171	
	17M (41 x 14 x 5 cm)	ME01172	--
	17G (41 x 14 x 9 cm)	ME01173	--
	23M (42 x 16 x 6 cm)	ME01231	--
	23G (42 x 16 x 12 cm)	ME01232	--
	28M (32 x 16 x 6 cm)	ME01284	
	28G (32 x 16 x 12 cm)	ME01285	
Package holder	Package holder (Ø 25 cm)	ME22420	ME22410
Trays	Tray	ME00230	ME00280
Water treatment unit	MELAdem 40 ion exchanger	ME01049	
	MELAdem 47 reverse osmosis unit	ME01047	
	MELAjet spray pistol	ME27300	
For the documentation	MELAflash CF-Card-Printer incl. CF card and card reader	ME01039	
	MELAnet Box	ME40296	
	MELAprint 44 log printer	ME01144	
	MELAprint 80 universal printer	ME01108	
	Serial interface cable, MELAprint 80	ME15823	
Other	Chamber Protect chamber cleaning set	ME01081	
Spare parts	Water stop (leakage water detector with shut-off valve and probe)	ME01056	
	Device fuse 20 A gRL	ME57589	
	Door gasket	ME58512	
	Sterile filter	ME20160	
	Slide clips for Plus/Universal mounts (10 pcs.)	ME81235	

Glossary

Accessory

Accessories are independent articles that are used with one or several medical devices. Accessories specifically and directly assist the intended purpose of the medical device.

Air leakage

An air leakage is a location through which air can pass in or out without this being desired. The verification of the leakage serves to prove that the volume of air ingress in the sterilization chamber during the vacuum phase does not exceed a value which would prevent steam penetration of the load and that the air leakage does not cause the possible contamination of the load during the drying phase.

AKI

AKI is the abbreviation for "Arbeitskreis Instrumentenaufbereitung" [Instrument Reprocessing Working Group].

Authorised technician

An authorised technician is a person intensively trained and authorised by MELAG who has sufficient specific device and technical knowledge. to perform maintenance and installation work on MELAG devices. Only they may carry out this work.

Batch

The batch is the composition of items which has been subject to the same reprocessing procedure.

BfArM

BfArM is the abbreviation for "Bundesinstitut für Arzneimittel und Medizinprodukte" [Federal Institute for Drugs and Medical Devices] in Germany.

Bowie & Dick test

The Bowie & Dick test is a vapour penetration test with standard test package, see EN 285. This test is recognised in large-scale sterilization.

CF card

The CF card is a memory medium for digital data; Compact Flash is an official standard, i.e. these memory cards can be used in every device fitted with the corresponding slot. The CF card can be read by every device that supports the standard and where necessary, written on.

Competent personnel

Trained personnel in accordance with national specifications for the respective area of application (dentistry, medicine, podiatry, veterinary medicine, cosmetics, piercing, tattoo) with the following contents: knowledge of instruments, hygiene and microbiology, risk assessment and classification of medical devices and instrument reprocessing.

Component

A component is a part of a medical device, which is delivered with it but is not permanently connected to it. A component supports or achieves the intended purpose of the medical device for at least one use case. It is not an independent accessory or medical device.

Condensate

Condensate is a liquid (e.g. water) that emerges from the vapour state when cooled and thus separates.

Conductivity

Conductivity is the ability of a conductive chemical substance or mixture of substances to conduct or transfer energy or other substances or particles in space.

Corrosion

Corrosion is the chemical alteration or destruction of metallic materials by water and chemical substances.

Delay in boiling

Superheating is the phenomenon that it is possible under certain circumstances to heat liquids beyond their boiling point without them boiling. This condition is unstable. Low-level agitation can produce a large bubble within the shortest period; this can expand explosively.

Demineralised water

Demineralised water does not contain minerals that are found in normal spring or tap water. It is obtained from tap water by ion exchange and used as feed water.

DGSV

DGSV is the abbreviation for "Deutsche Gesellschaft für Sterilgutversorgung" [German Society for Sterile Supply]. The training guidelines of the DGSV are listed in DIN 58946, Part 6 as requirements for personnel.

DGUV Regulation 1

DGUV is the abbreviation for "Deutsche Gesetzliche Unfallversicherung" [German Statutory Accident Insurance]. The regulation 1 governs the principles of prevention.

DIN 58953

Standard for "Sterilization – Sterile supply"

Distilled water

Distilled water is largely free of salts, organic substances, and micro-organisms. It is obtained by distillation (evaporation and subsequent condensation) from normal tap water or pre-purified water. Distilled water is used as feed water.

Dynamic pressure test

The dynamic pressure test serves to prove that the rate of pressure variations in the sterilization chamber during a sterilization cycle does not exceed a particular value which could result in the damage of the packaging material, see EN 13060.

Empty chamber test

The empty chamber test is a test without a load and is performed to assess the performance of the steam sterilizer without the influence of a load. This allows the temperatures and pressures obtained to be checked against the intended settings, see EN 13060.

EN 13060

Standard for "Small steam sterilizers"

EN ISO 11607-1

Standard for "packaging for medical devices to be sterilized in the final packaging – Part 1: Requirements placed on materials, sterile barrier systems, and packaging systems"

Equipment

Equipment is an article that can be used with the medical device, however, it is not necessary for assisting and/or achieving the intended purpose of the medical device. It is not an independent accessory or medical device.

Feed water

Feed water is required to generate the water vapour for sterilization; guide values for water quality in accordance with EN 285 or EN 13060 – Appendix C.

Heat-up phase

The heating time is the time required for the double-jacket steam generator to heat up after the device has been switched on or after a reprocessing program has been started before the sterilization process starts. The duration depends on the sterilization temperature.

KRINKO

KRINKO is the abbreviation for "Kommission für Krankenhaushygiene und Infektionsprävention" [Commission for Hospital Hygiene and Infection Prevention] at the Robert Koch Institute in Germany.

Load

The load includes products, equipment, or materials that are reprocessed together in one operating cycle.

Medical device

Medical device means any instrument, apparatus, appliance, software, implant, reagent, material or other article intended by the manufacturer to be used, alone or in combination, for human beings for one or more of the specific medical purposes in accordance with Regulation (EU) 2017/745 Article 1, Paragraph 4.

Mixed loads

The load within a batch includes both packed and unpacked products.

Multiple wrapping

The load is sealed in a double layer of film, instruments wrapped in foil are additionally planed in a container or containers wrapped in textiles.

Porous

Porous describes the property of materials (e.g. textiles) to allow water, air, or other liquids to pass through.

Porous full load

The porous full load specification serves to prove that the values set at the control satisfy the necessary sterilization conditions in porous loads with the maximum density for whose sterilization a steam sterilizer is designed to EN 13060.

Porous partial load

The porous partial load specification serves to prove that the values set on the control allow steam to enter the pre-determined test package quickly and equally, see EN 13060.

Process evaluation system

The process evaluation system (also known as "self-monitoring system") monitors itself and compares sensors during running programs.

Product with narrow lumen

A product with narrow lumen is either open on one side or on both sides. The following applies for an article open on one side: $1 \leq L/D \leq 750$ and $L \leq 1500$ mm. The following applies for an article open on both sides: $2 \leq L/D \leq 1500$ and $L \leq 3000$ mm and which does not correspond to the hollow body B (L = hollow body length, D = hollow body diameter), see EN 13060.

Qualified electrician

The qualified electrician has the suitable technical training, knowledge, and experience to recognise and avoid hazards that can be caused by electricity, see IEC 60050 or for Germany VDE 0105-100.

Reprocessing

Reprocessing is a measure to prepare a new or used healthcare device for its intended purpose. Reprocessing includes cleaning, disinfection, sterilization and similar procedures.

RKI

RKI is the abbreviation for "Robert Koch-Institut" [Robert Koch Institute]. The Robert Koch Institute is the central institution for the detection, prevention, and control of diseases, especially infectious diseases.

Simple hollow bodies

A simple hollow body is either open on one side or both sides, see EN 13060. The following applies for an article open on one side: $1 \leq L/D \leq 5$ and $D \geq 5$ mm. The following applies for an article open on both sides: $2 \leq L/D \leq 10$ and $D \geq 5$ (L = hollow body length, D = hollow body diameter).

Single wrapping

The load is wrapped once in a sterile barrier system (e.g. transparent sterilization package). The opposite of this is multiple wrapping.

Soft sterilization packaging

A soft sterilization wrapping is a paper bag or a transparent sterilization package.

Solid

Solid describes the property of a product that is made of non-porous material that has no bulges or other design features that offer greater or equal resistance to steam penetration than a simple hollow body.

Solid load

The solid load specification serves to prove that the necessary sterilization conditions have been reached within the entire load with the values set in the control. The load must represent the largest weight of solid instruments for whose sterilization a steam sterilizer is designed to EN 13060.

Sterile barrier system

The sterile barrier system is a minimum level of sealed packaging that prevents the entry of micro-organisms (e.g. sealed pouches, sealed reusable containers, folded sterilization wipes) and allows for the aseptic delivery of the product at the point of use.

Sterile material

Sterile goods are successfully sterilized (i.e. sterile) goods. Sterile goods are also referred to as batches.

Sterilization chamber

The sterilization chamber is the part of the steam sterilizer where the load is sterilized.



MELAG Medizintechnik GmbH & Co. KG

Geneststr. 6-10

D-10829 Berlin

Germany

Email: info@melag.com

Web: www.melag.com

Original instructions

Responsible for content: MELAG Medizintechnik GmbH & Co. KG

We reserve the right to technical alterations

User Manual

for the

Autoclave

with device software version 3.20 et sqq.

Euroklav[®] 23-S

Dear Doctor:

Thank you very much for the trust which you have shown by purchasing this autoclave.

For more than 55 years now, MELAG — a medium-sized family-owned and -operated company — has specialized in the production of sterilization equipment for medical practice. During this period, MELAG has succeeded in becoming a leading manufacturer of sterilization equipment. More than 400 000 MELAG units sold throughout the world testify to the exceptional quality of our sterilizers. — which are manufactured exclusively in Germany.

As all other MELAG products, this autoclave was manufactured and tested according to strict quality criteria. Before placing this unit into operation, please read this User Manual carefully. The long-term functional effectiveness and the preservation of the value of your autoclave will depend on careful preparation of instruments before sterilization, and on proper care of the unit.

The staff and management of MELAG



To ensure the functional effectiveness of this unit and to preserve its value:

1. Prepare the instruments to be sterilized carefully
2. Take proper care of the autoclave
3. Use only pure distilled or demineralized water

CONTENTS

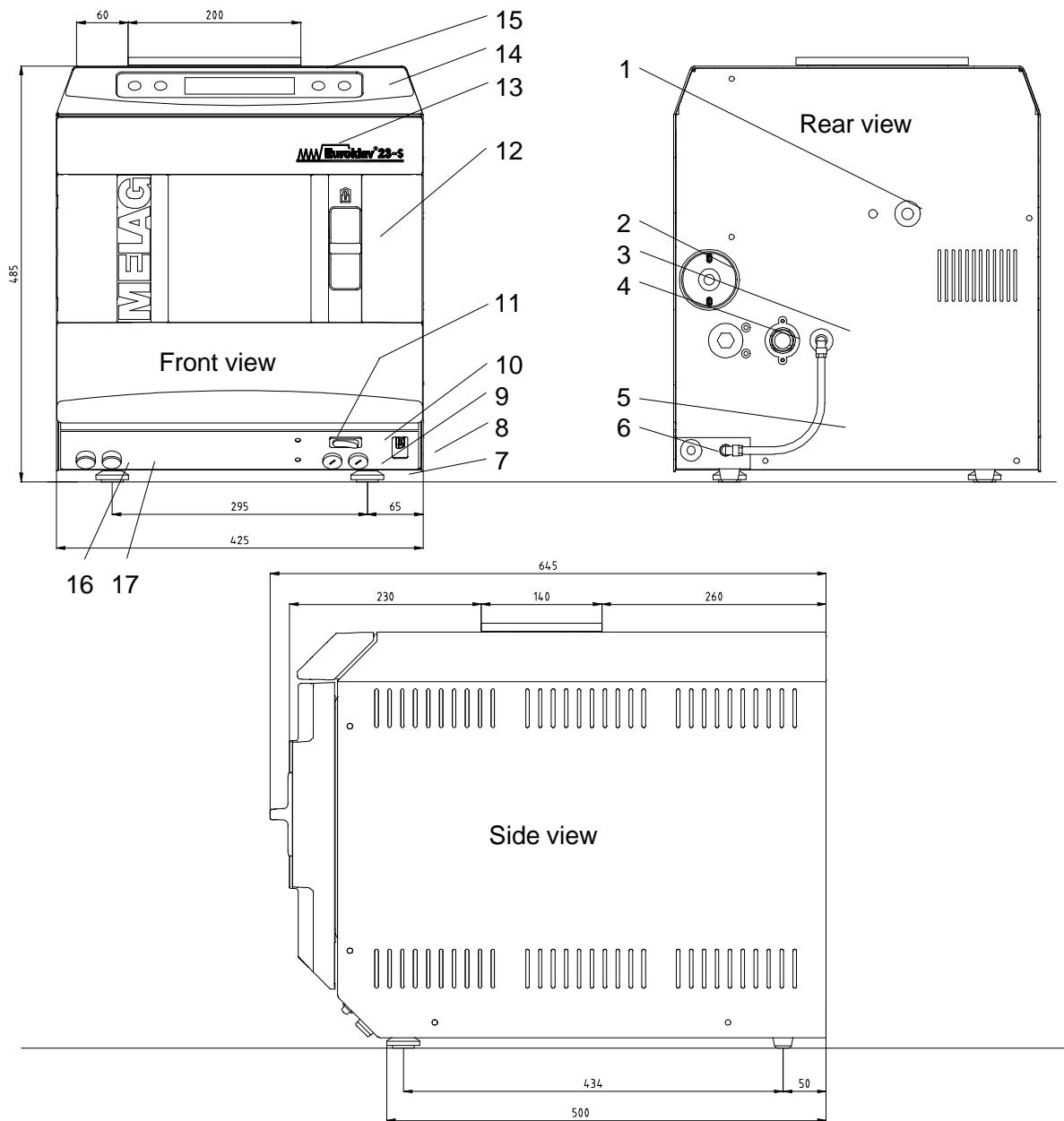
1. DESCRIPTION OF THE UNIT	4
1.1 Views of the unit.....	4
1.2 Control panel.....	5
1.3 Technical data.....	5
1.4 Performance features of this autoclave	5
1.4.1 Pulsed flow method.....	5
1.4.2 Operating range for sterilization.....	5
1.4.3 Integrated steam generation	5
1.4.4 One-way/Closed-loop system/ Conductivity measurement/ Automatic water refilling.....	5
1.4.5 Electronic Parameter Control EPS.....	6
1.4.6 Pressure pulsing drying.....	6
1.4.7 Pre-heating.....	6
1.4.8 Documentation	6
2 INSTALLATION	6
2.1 Setting up the autoclave	6
2.2 Transport ribbons.....	6
2.3 Levelling	7
2.4 Mains power supply	8
2.5 Outlet connection for one-way water	8
2.6 Internal water supply with demineralized/distilled water.....	8
2.7 Connection of a water purification system.....	8
3 INITIAL START-UP.....	8
3.1 Printer connection / Initialisation (optional)	8
3.1.1 Connecting the MELAprint®42	8
3.1.2 Initialisation of the printer / Setting up immediate print-out.....	8
3.2 Test run	8
3.3 Installation record.....	8
3.4 Safety instructions.....	9
4 INSTRUCTIONS FOR ALL STERILIZATION PROCEDURES.....	9
4.1 Electricity and water supplies	9
4.1.1 Distilled or demineralized feed water	9
4.1.2 Power supply.....	9
4.2 Preparing instruments for sterilization	9
4.3 Loading the autoclave.....	10
4.4 Closing the door.....	11
4.5 Program selection	11
4.6 Program start	13
4.7 Program progress	13
4.8 Print-out record	15
4.9 Removing the sterilized items.....	16
4.10 Sterile storage.....	16
4.11 Sterilization frequency / pauses	16
4.12 Manual termination of program.....	17
4.12.1 Termination of sterilization	17
4.12.2 Terminate drying	18
4.13 Reaction to warnings / error messages	19
4.14 Operational pauses.....	19
5 CLOSING DOWN / TRANSPORT / REINSTALLATION	19
6 SPECIAL FUNCTIONS.....	20
6.1 Water quality (conductivity) / Chamber preheating temperature	20

6.2	Selecting extra drying	20
6.3	Records / Load documentation	20
6.3.1	Record print-out	20
6.3.1.1	External printer	20
6.3.1.1.1 Connecting the external MELAprint®42 printer		20
6.3.1.1.2 Initialising the printer		21
6.3.1.2	Connection to an external PC	21
6.3.1.2.1 Installation		21
6.3.1.2.2 Downloading to a PC		21
6.3.1.3	No printer	22
6.3.2	Immed. print-out? Yes/No	22
6.3.3	Printing out stored records	23
6.3.4	Print all stored cycle records	24
6.3.5	Display printer memory status	25
6.3.6	Deleting cycle records	26
6.3.7	Test print-out	27
6.4	Resetting date and time	28
6.5	Automatic preheating	29
6.6	Total load count	30
6.7	Distilled / demineralized water supply	31
6.8	Water-system	32
6.9	Program modifications	32
7 SPECIAL FUNCTIONS		33
7.1	What to do if the autoclave malfunctions	33
7.2	Malfunctions without display messages	33
7.2.1	No display	33
7.2.2	Excessive water consumption	33
7.2.3	Poor drying	33
7.3	Warning messages	34
7.4	Error reports	37
8 TAKING CARE OF YOUR AUTOCLAVE		40
8.1	Preparation of instruments	40
8.2	Rust formation = Drag-in rust	40
8.3	Taking care of the Euroklav®23-S	40
8.3.1	Cleaning	40
8.3.2	Use of demineralized or distilled water	41
8.4	Checking the operation of the autoclave	42
8.4.1	Safety with automatic monitoring	42
8.4.2	Periodical bacteriological testing (twice a year)	42
8.4.3	Maintenance recommendations	42
9 ANNEX		43
9.1	Installation options	43
9.2	Additional technical data	44
9.2.1	Capacity/Weight	44
9.2.2	External supplies	44
9.2.3	Operational parameters	44
9.2.3.1	Programs / Operation times	44
9.2.3.2	Energy / Water consumption *)	44
9.3	Instructions on drying	45
9.3.1	Drying in sterilization containers	45
9.3.2	Textiles	46
9.3.3	Instruments	47
9.3.4	Loading the autoclave	47
9.3.5	Loading containers with soft sterilization packing material	47
9.3.6	Stacking sterilization containers	48
9.3.7	Removing the sterilized items	48
9.3.8	Improving the drying	48

1. Description of the unit

1.1 Views of the unit

Fig. 1 Views of the Euroklav®23-S



1	Safety valve I	9	Fuses - 2 x 16 A / FF
2	Sterile filter	10	Power switch
3	Connection for internal distilled / demineralized water supply	11	Overheating trip-switch, steam generator
4	One-way water outlet (3/4")	12	Sliding door lock
5	Pipe connection for internal demineralized / distilled water supply	13	Door (left side hinge)
6	Mains power cable	14	Control panel
7	Adjustable front feet	15	Tank lid
8	Serial data and printer port (RS 232)	16	Outlet connection for wastewater
		17	Outlet for distilled / demineralized water

1.2 Control panel

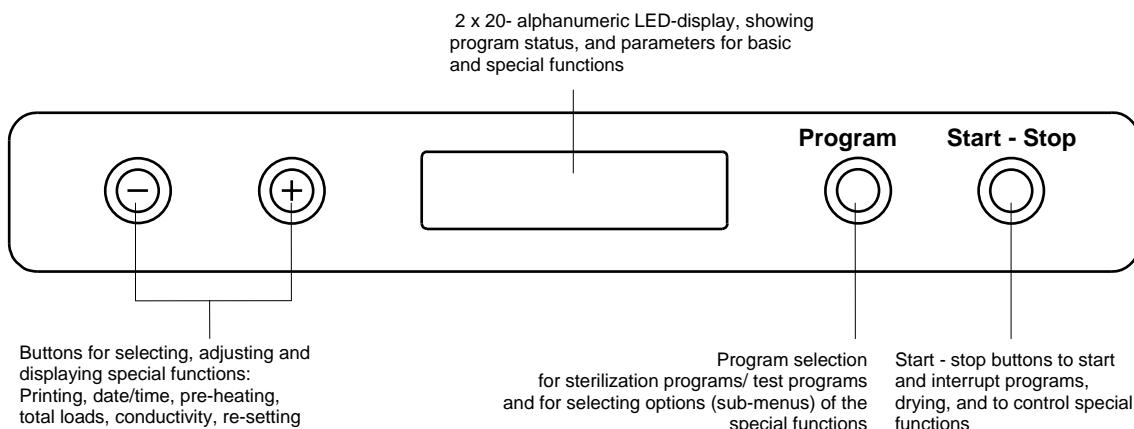


Fig. 2 Control panel Euroklav®23-S

1.3 Technical data

Sterilization space (diameter x depth)	:	25cm x 47cm
Electric power supply	:	3000W / 230V AC / 16 A / 50...60Hz
Sterilization pressure / temperature	:	2bar/134°C; 1bar/121°C
Maximum load:	:	4kg instruments or 0.6kg textiles

Further technical details are included in the Annex

1.4 Performance features of this autoclave

1.4.1 Pulsed flow method

With the pulsed flow method which is used steam flows into and then out of the autoclave to ensure effective penetration of the items to be sterilized by superheated steam.

This makes it possible to carry out demanding sterilization tasks rapidly and reliably, such as for example the sterilization of wrapped instruments or textiles.

The steam penetration can be tested by implementing a special test program for the Bowie & Dick Test, which is the standard test for large-scale sterilization operations..

1.4.2 Operating range for sterilization

The Euroklav®23-S features three sterilization programs for temperatures at 134°C: the "Universal Program" (for wrapped objects), the "Prion Program" (a special Universal Program), the "Quick Program" for unwrapped items, and the "Gentle Program" (a sterilization program for textiles and rubber articles at 121°C). The user can at any time perform an additional functional check of the autoclave by running the Bowie & Dick Test for steam penetration. The additional program "MELAsteam®" is available as an option, and functions at a temperature of 136°C.

1.4.3 Integrated steam generation

The powerful steam generation in the sterilization chamber makes it possible to sterilize large loads of instruments or textiles in a short time. This system of steam generation means that excess temperatures in the sterilized chamber are not possible.

1.4.4 One-way/Closed-loop system/ Conductivity measurement/ Automatic water refilling

The Euroklav® 23-S can be operated in the tried and tested one-way system, in which steam, condensed water and all dissolved impurities are led away at the end of every sterilization cycle, and fresh demineralized or distilled water is then used. This is particularly good for all the materials used. However, in some instances it is also important to use less water, and the Euroklav® 23-S can also be used in a water-conserving closed-loop mode. In this case the used water flows from the left side of the double-chamber storage container over the separating wall into the right-hand chamber. This water is then used again in the next sterilization cycle. With the closed-loop operation it is important that the instruments to be sterilized have been very carefully washed and swilled in purified water. The water in the autoclave must also be exchanged once a week.

An integrated electrical conductivity meter monitors the quality of the demineralized or distilled water used to generate the steam. Using the recommended one-way operation for the autoclave, the increased consumption of demineralized or distilled water can be provided by a water purifier such as the MELAdem® 47 or MELAdem® 37, which can be directly connected to the autoclave.

Provided that the instruments are prepared carefully for the sterilization, stains on the load and soiling of the autoclave itself can be prevented.

1.4.5 Electronic Parameter Control EPS

The microprocessor in the Euroklav®23-S makes it possible to monitor pressure, temperature and time continuously during a program by Electronic Parameter Control. The overall operating time can then be optimised according the load and the temperature of the autoclave.

The process assessment and monitoring system in the program control compare current process parameters with standard process data and monitors the process relative to limit values for temperatures, times and pressures. This makes it possible to identify faults as they occur, and provides quality assurance for the sterilization process.

1.4.6 Pressure pulsing drying

This method ensures good drying results even for wrapped instruments.

1.4.7 Pre-heating

By activating the "pre-heating" function, the cold autoclave chamber can be warmed up before sterilization, or the temperature can be maintained between sterilization runs. This reduces the duration of cycles and considerably reduces the formation of condensation, thus improving drying results.

1.4.8 Documentation

The electronic memory stores records of the previous 40 programs.

For effective hard-copy documentation and for checking purposes a MELAprint®42 printer can be connected to print out a record immediately after completion of a program or to print out records from the memory.

2 Installation

When setting-up and installing the autoclave, please consult the separate instruction leaflet "Installing the Euroklav®23-S".

2.1 Setting up the autoclave

The autoclave should be set up in a dry place which is protected against dust.

The base should be stable, and able to support the weight of the appliance (unloaded weight 43 kg).

The space required by the autoclave can be seen from the external dimensions (as in Section 1.1). A minimum additional space of 5 cm should be allowed on either side and above the autoclave in order to ensure that heat can escape.

The electrical power supply should be a separate 230V AC circuit with a 16 A fuse.

Should it be decided at some stage to install an automatic one-way water system, it is necessary to have a connection to the wastewater plumbing near the autoclave, preferably a wall outlet (NW 40) or a sink-trap (standard length of outflow pipe 2m, 16 mm width). The work surface on which the autoclave stands must be higher than the outlet, and the outlet pipe must be without bends and twists which could prevent water flowing out freely. At the same time, the work surface must provide convenient access to the autoclave, and the display must be clearly visible.

The autoclave can be supplied with demineralized/distilled water from the integrated two chamber storage tank, with freshwater and wastewater chambers. Alternatively, the Euroklav®23-S can also be connected to an external water purifier - MELAdem®47 or MELAdem®40 (or an equivalent water purification system). However, please note that this will require additional space.

2.2 Transport ribbons

Take the autoclave out of the packaging by means of the transport ribbons. The ribbons themselves are each removed by undoing two retaining screws, which must then be screwed firmly back in place without washers.

2.3 Levelling

In order to ensure that condensate can drain out of the autoclave (which is important if it is to operate properly) the appliance must be higher at the front than at the back. The autoclave should first be installed in a horizontal position (this should be checked with a spirit level at the chamber flange) and then the front feet should be extended by giving them five (5) turns.

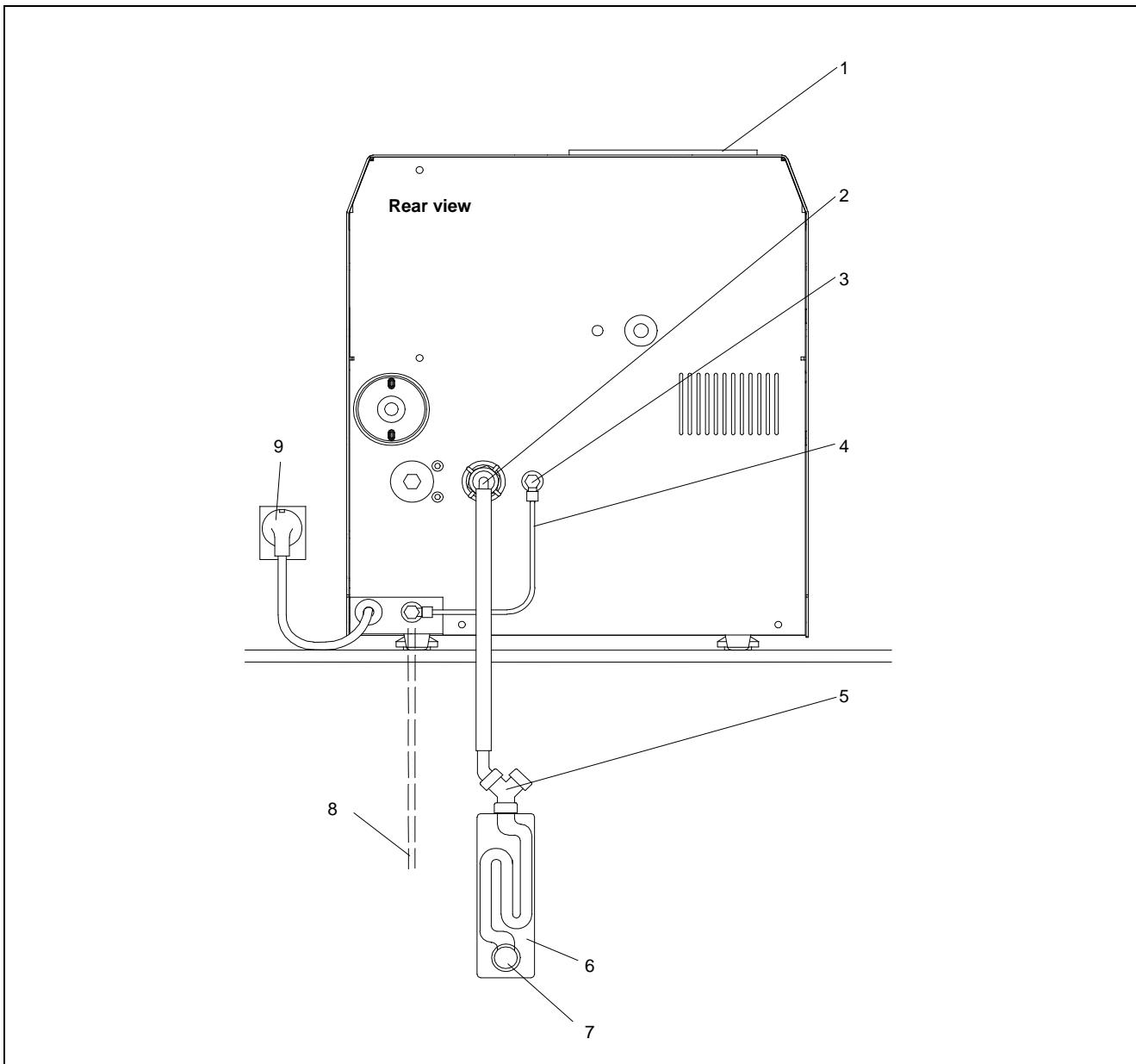


Fig. 3 Installation of the Euroklav®23-S with wall-mounted trap

- 1 Tank lid
- 2 One-way outlet
- 3 Connection for internal supply of demineralized/distilled water
- 4 Pipe link for internal supply of demineralized/distilled water
- 5 Y-connection with non-return valve (included in Item 6)
- 6 Wall-mounted trap (MELAG- Art.- No.: 37410)
- 7 Wall outlet (NW 40)
- 8 Supply line for external supply of demineralized/distilled water
- 9 Mains power supply

2.4 Mains power supply

The electric cable of the appliance is plugged into a mains socket rated at 230 V, 50 Hz. The power rating of the autoclave is 3000 W. In order to avoid overloading the electricity supply, we recommend using a separate electrical circuit fitted with a 16 A fuse and optionally protected with a 30mA circuit breaker.

2.5 Outlet connection for one-way water

The connection for the one-way water outlet at the back of the appliance is connected to the drainage system of the building by means of the outlet pipe (textile-reinforced transparent pipe, DN16). It is important that the pipe should have a steady downward gradient, without twists and kinks.

When connecting to a separate outflow pipe NW40, a wall-mounted trap should be used (MELAG Art.-No. 37410, see Fig. 3).

2.6 Internal water supply with demineralized/distilled water

The internal supply of demineralized/distilled water is used for the autoclave in closed-loop operation (see page 44, Fig. 4), the water is extracted from the right chamber of internal water storage tank. The autoclave is supplied with a pipe link with two swivel connections installed to connect the storage tank outlet with the inlet for demineralized/distilled water. To fill the tank the lid must be removed and the demineralized/distilled water of suitable purity filled into the right-hand chamber until the Max mark.

2.7 Connection of a water purification system

The autoclave can be connected directly to a water purification unit which provides the demineralized or distilled water required (see page 44, Fig. 4). Instead of connecting the feed water inlet to a storage container, it is simply connected directly to the water purification unit.

The reverse-osmosis system MELAdem® 47 and the ion-exchanger MELAdem® 37 are ideally suited to provide the quantity and quality of water needed for the Euroklav® 23-S.

Detailed instructions on the installation of these water purification units are provided in their operating manuals.

When connecting water purification systems from other manufacturers it is very important to ensure that they are able to provide sufficient amounts of water at the required purity. You are generally advised to consult MELAG first.

3 Initial start-up

3.1 Printer connection / Initialisation (optional)

3.1.1 Connecting the MELAprint®42

The autoclave can be connected to an external printer, the MELAprint®42. This is not supplied as standard with the autoclave.

In order to connect the printer to the autoclave follow the description in Section 6.3.1.1.1.

3.1.2 Initialisation of the printer / Setting up immediate print-out

Initialise the external printer (registering with the processing unit of the autoclave) as described in Section 6.3.1.1.2. In order to select the immediate print-out option, which means that a record of each sterilization is printed out automatically as soon as it has finished, proceed as described in Section 6.3.1.3.

3.2 Test run

In order to check the operation of the autoclave under realistic conditions, a test run should be carried out with the "Universal Program, 134°C wrapped" and a relevant load. After loading the autoclave and selecting the program with the "Program" button, sterilization is started by pushing the "Start/Stop" button. If the program runs correctly, the following message will appear on the display (see Section 4.7):



with the values for the maximum values for pressure and temperature. If the immediate printout option has been selected for an external printer a record of the program run will be printed.

3.3 Installation record

As documentation that the autoclave has been set-up properly, an installation record should be produced by an authorised person and a copy sent to MELAG. This is important in the event that you wish to make claims under warranty provisions.

3.4 Safety instructions

- ☞ When opening the door, particularly after interrupting the drying process, residual steam can escape from the autoclave chamber.
- ☞ After opening the door, do not touch any metal surfaces - these will be hot! Danger of burns. Always use the tray lifter to remove trays, or wear suitable hand protectors when taking out other items
- ☞ If you install the optional water purifier MELAdem®47 or MELAdem®40 we recommend the installation of a water leak detector (see installation details Section 2).
- ☞ If you intend to install a water purification unit from another manufacturer, then consult MELAG before you do so.
- ☞ The appliance is not suitable for sterilizing liquids.
- ☞ Under current VDE-regulations, this appliance is not suited for use in areas where there are risks of explosion.
- ☞ The appliance must only be serviced and repaired by MELAG or by its authorised representatives (specialist dealers or customer services) using only original parts and following service instructions.
- ☞ Before opening the housing always disconnect from the mains power supply!
- ☞ In order to ensure effective sterilization with the autoclave observe the instructions in this User Manual, and in particular ensure that the loading of the autoclave is appropriate for the program selected.
- ☞ This appliance is only intended for use outside the patient environment (radius 1.5 metres around the treatment location).

4 Instructions for all sterilization procedures

4.1 Electricity and water supplies

4.1.1 Distilled or demineralized feed water

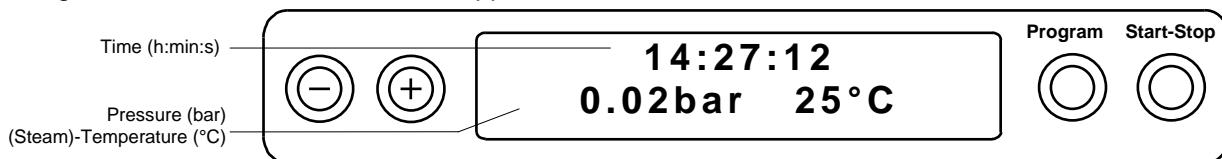
The autoclave automatically monitors the availability of cooling water and purified water, as well as the quality of the distilled / demineralized water before starting a program.

In order to allow an immediate program start and to avoid error reports or interruptions of programs (see Sections: 7.3 and 7.4) :

- Before the first sterilization at the start of the working day, check that the internal water supply has sufficient water in the right chamber of the double internal tank. If necessary, refill with water of appropriate quality (see Section 8.3.2).
- If the feed water is drawn directly from a MELAdem®47 water purifier, check that its water supply is turned on in good time (this may be up to an hour before starting a sterilization program), if the water supply has been turned off over night, for example.

4.1.2 Power supply

Switch on the power using the switch on the front of the autoclave (bottom right). About 15 seconds after the message "Please wait Door release" the appliance is in the start status:



4.2 Preparing instruments for sterilization

MELAG - rust-free materials

All parts of the Euroklav®23-S which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust

The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).

Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization

The example of the formation of film rust shows how important it is to prepare items properly before sterilization.

Handpieces and contra-angles must be cleaned before sterilization and maintained (e.g. by oiling).

Other instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103, or similarly strict national codes of practice in a disinfectant and/or cleaning solution at the correct concentration for the correct length of time

MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment for handpieces for contra-angles, as well as thermo-disinfecting devices.

It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. Turbines and handpieces must be oiled in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments

The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.

Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

4.3 Loading the autoclave

It is of crucial importance for effective sterilization and good drying that the autoclave is loaded properly:

When loading the autoclave, take account of the following points:

Tray rack

For the Euroklav®23-S there are 2 types of tray rack:

Mount "B" (MELAG-Art.-No.: 40224) for up to 4 trays or 4 standard tray-cassettes.

Mount "C" (MELAG-Art.-No.: 40242) for up to 6 trays or 3 standard tray-cassettes.

Both types of tray rack are also suitable for the MELAG-sterilization containers Type 15K,M,G; Type 17K,M,G; Type 17R; Type 23R,M,G Type 28M,G).

Normally, the autoclave should be used in conjunction with a tray rack, since this ensures that steam penetration and drying are as good as possible. In exceptional situations (e.g. when using sterilization containers from other manufacturers), and after consultation with your specialist dealer or with MELAG, the tray rack can be removed and the container can be placed directly in the autoclave chamber.

For the sterilization of instruments sealed in transparent sterilization wrapping, it is recommended that you use the foil stand MELAG-Art.-No.: 22420. This contributes considerably to the drying process for such wrapped instruments.

Trays

Trays for objects which are to be sterilized must be perforated, in order to allow condensation to run away. MELAG-trays are recommended. If you use dishes or trays without perforations, then the objects being sterilized will not dry properly.

Enclosed sterilization containers

Enclosed sterilization containers must be perforated on at least one side (preferably underneath) or must have valves, in order to ensure that steam can penetrate and condensate can run out. All MELAG-sterilization containers meet these requirements with perforations on two sides and filter-cloth- inlays.

Sterilization containers which only have perforations on the top only allow limited drying.

If sterilization containers are stacked in the autoclave, it is important to ensure that the perforations are not blocked.

Transparent sterilization packaging

If you use transparent sterilization packaging, such as MELAfol®, then the items should if possible be stood vertically on the tray, or sterilized in foil holders (MELAG-Art.-No.: 22420). They should never be laid flat one on top of the other.

If seals split open during sterilization it may be necessary to increase the length of the impulse on the sealing device or to use a double-seal.

Standard tray-cassettes sealed in MELAfol® (250 mm wide) must be taped and clasped additionally to ensure that the side-seals do not split open.

Multiple wrapping

The pulsed flow method means it is possible to use multiple wrapping.

Maximum loads

Loads should not exceed 4 kg of instruments or 0.6 kg of textiles.

Mixed loads

If mixed loads of textiles and instruments are to be sterilized, then as far as possible the textiles should be above the instruments and direct contact with the instruments should be avoided.

Inclusion of textiles and instruments in the same sterilization container is not desirable.

Textiles should never come into direct contact with the walls of the chamber.

If different types of packaging are included in a load, then:

- Instruments and sterilization containers should be at the bottom
- Transparent and paper sterilization packaging should be at the top (but lower than textiles)

Liquids

The appliance is not suitable for the sterilization of liquids!

Suitability for sterilization

Relevant information provided by manufacturers of instruments and textiles about sterilization should be strictly observed.

4.4 Closing the door

The door is closed by lightly applying pressure in the direction of the chamber flange and at the same time pressing down the sliding door catch. The display shows the message:



4.5 Program selection

A program should be selected which is appropriate for the physical properties of the items being sterilized (and in particular their heat resistance) and the type of packaging (if any part of the load is wrapped, then either the "Universal Program" or the "Gentle Program" must be used).

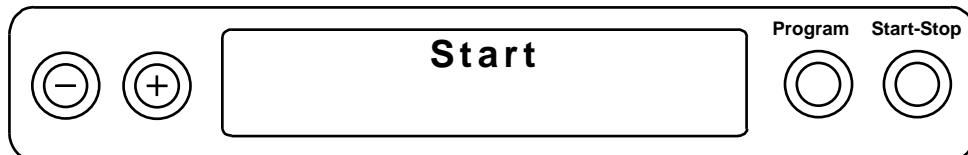
By pressing the "Program selection" button it is possible to review the display of the following programs for selection:

Parameter/Application	Program name/Display message
Universal program at 134°C, 2 bar, and a sterilization time of 3.5 min for the sterilization of wrapped items, in particular instruments (no Hollow A), or mixed loads (unwrapped/wrapped)	Universal Program 134°C wrapped Program
Quick Program at 134°C, 2 bar and a sterilization time of 3.5 min for the sterilization only of unwrapped instruments (no Hollow A, no textiles) for rapid re-use (drying can be interrupted manually)	Quick Program 134°C unwrapped Program
Gentle Program at 121°C, 1 bar, sterilization time 15 min for the sterilization of all types of wrapped items (except Hollow A), in particular large amounts of textiles or thermolabile materials (plastic, rubber), or mixed loads (wrapped/unwrapped)	Gentle Program 121°C wrapped Program
Bowie & Dick Test Program at 134°C, 2 bar and a sterilization time of 3.5 min. to check the operation of the autoclave (Steam penetration of special indicators)	Bowie & Dick Test 134°C 2.2bar 3.5min' Program

Parameter/Application	Program name/Display message
<p>Prion Program (a special Universal Program) at 134°C, 2 bar, and with sterilization time extended to 20 min, for sterilization of wrapped items, especially instruments and/or mixed loads (i.e., packed and unpacked). This program is recommended for sterilization of instruments used in situations in which the danger of infection by pathologically modified proteins is suspected: for example, Creutzfeld-Jacob and BSE).</p>	<p>Program</p> <p>Prion-program 134°C wrapped 20'</p>
<p>MELAsteam Cleaning at 136°C, 2.3 bar, and a maximum cleaning time of 60 min., for the steam cleaning of instruments that have <u>already been disinfected</u>.</p> <p>CAUTION: Use only together with a permanently installed MELAsteam® Pistol (otherwise the system is disabled).</p> <p>See the Operator's Manual for MELAsteam®.</p>	<p>Program</p> <p>MELAsteam-Cleaning 2.3bar 60'</p>
<p>Basic display (no program selected)</p>	<p>Program</p> <p>15:31:33 0.02bar 22°C</p>

4.6 Program start

Press the "Start-Stop" button once the desired program is shown on the display. The availability of cooling water, and feed water will be checked automatically, with a conductivity measurement.

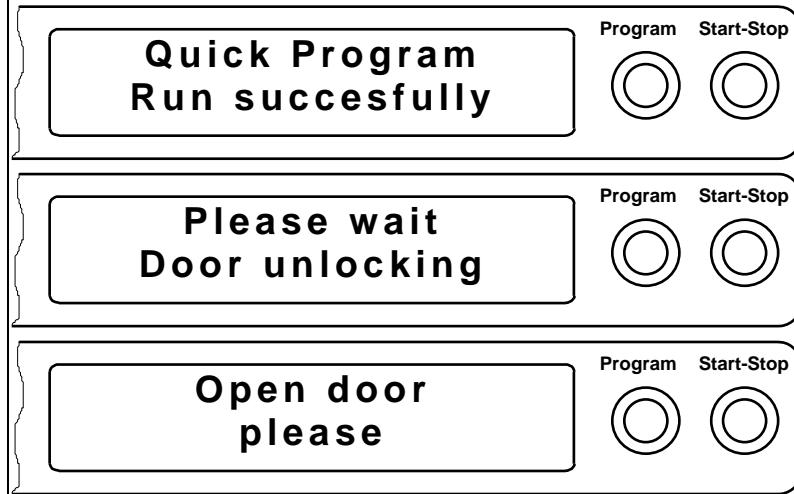


At the start of the quick program there will be an additional message "Warning: Only unwrapped instruments". This message must be acknowledged by pressing "Start" again.

4.7 Program progress

After starting the program, it will then progress automatically. The display shows the current program status as follows:

Program status	Display message
1. Phase 1 and following Depending on the program chosen and the temperature of the chamber at the start of the program, a number of cycles of steam inflow and outflow follow to ensure adequate penetration of super-heated steam into the items being sterilized.	1. Fractionation 0.69 bar 115°C Program Start-Stop
2. Heating phase A heating-up phase follows. The continuous introduction of steam raises pressure and temperature in chamber to the values needed for the program	Heat up 1.80 bar 117°C Program Start-Stop
3. Sterilization phase When the required pressure and temperature have been reached the sterilization proper then begins. The display shows alternately the pressure and temperature and the time remaining.	Sterilization 2.18 bar 135°C Program Start-Stop Sterilization Still 2 min 12 sec Program Start-Stop
4. Pressure release After completion of the sterilization time, the pressure is released and the steam generator emptied. Pressure and temperature fall.	Pressure release 0.85 bar 96°C Program Start-Stop
5. 1st drying phase (Flow drying) After pressure release the drying phase begins. Throughout the drying phases the program can be ended without an error report, since the sterilization itself has been completed. However, with the exception of the "Quick Program" you should normally wait until the drying is completed..	Flow drying 1' 0.9bar 85°C Program Start-Stop Immediate removal Press 'Stop' Program Start-Stop

Program status	Display message
6. Program end After ventilation of the chamber the program is completed. If a printer is attached and print-out "yes" is selected, the record will be printed-out immediately. After the door has automatically unlocked the door can be opened to remove the sterilized objects.	<p>Quick Program Run successfully</p> <p>Please wait Door unlocking</p> <p>Open door please</p> 

4.8 Print-out record

The print-out record contains the following information:

----- MELAG Euroklav 23-S -----			
Program	Universal-program	Date	
	134°C wrapped		
Date	03.04.2000	Time of start	
Time of day	08:21:43 (Start)		
Batch number:	3	Running load number for the day	

Preheating	107.5 °C	Pre-heating temperature	
Conductivity	16 µS/cm	Conductivity of purified feed water	
Program step	Press. bar	Temp. °C	Time min
Start	0.01	58.7	00:00
1. Fractionation			
Steam entry	1.00	81.0	01:10
Press. release	0.19	84.0	01:29
2. Fractionation			
Steam entry	1.01	106.2	02:31
Press. release	0.19	94.8	03:01
3. Fractionation			
Steam entry	1.00	114.8	04:07
Press. release	0.19	99.6	04:48
4. Fractionation			
Steam entry	1.01	118.1	05:55
Press. release	0.19	99.5	06:42
5. Fractionation			
Steam entry	1.00	118.7	07:48
Press. release	0.20	98.2	08:40
6. Fractionation			
Steam entry	1.00	118.2	09:49
Press. release	0.19	97.1	10:45
Heat up	2.04	132.5	13:15
Steriliz.begin	2.04	132.5	13:15
Steriliz.end	2.17	135.6	16:45
Pressure release	0.50	113.2	17:52
Current-drying			
Drying begin	0.50	113.2	17:52
Drying current	0.40	100.2	18:23
Drying pumping	1.12	102.7	18:50
Drying end	1.11	109.3	37:44
End	0.54	106.7	37:54

Final report			

PROGRAM PROPERLY EXECUTED!			

Temperature	: 135.5 +0.2 /-0.4 °C	Duration of sterilization	
Pressure	: 2.17 +0.01/-0.01 bar		
Sterilize time:	3 min 30 s	Time at end of program	
Time of day	: 08:59:37 (End)		
=====			
84 0000815 3.16 1.13		Info-line with total number of loads, Works number and software version.	

4.9 Removing the sterilized items

After opening the door the sterilized items can be removed.

Be careful when removing the sterilized items! Touching the metal surfaces can lead to burns. Always use the appropriate aids to lift the trays (MELAG-tray lever, standard tray-lifter) or wear suitable hand protection.

4.10 Sterile storage

After removing wrapped sterile items, the wrapping should be checked for any signs of damage. If it is defective (e.g. split seals) then the sterilization of the items must be repeated after the items have been re-wrapped.

It is important for sterile storage that the items have been properly dried. The Euroklav®23-S provides very good drying if the program has not been interrupted before its completion and the autoclave has been properly loaded (see Section 4.2). Directly after sterilization there may still be residual condensation on the items or the container. Because the items are hot on removal, this will usually evaporate quickly. The German industrial standard DIN 58953 Part 7 Section 7 contains the following comment about residual moisture on paper wrapping or transparent sterilization paper after sterilization: "...small amounts of water on the wrapping are unproblematic, provided they have evaporated within 30 minutes after removal from the steam sterilizer....." After cooling, wrapped sterilized objects should be stored in a place where they are **protected from dust** (e.g. instrument cupboard). Given proper storage, DIN 58953 Part 7 gives the following guidelines for the maximum storage periods for sterilized objects: in basic wrapping (e.g. transparent sterilization foil) up to 6 weeks; in double-wrapping up to 6 months.

4.11 Sterilization frequency / pauses

After completing or terminating the drying phase, the autoclave can be reloaded and started immediately. However, continuous operation can lead to increased development of water vapour from the water storage tank. This is not harmful for the Euroklav®23-S provided there is sufficient space around it for ventilation (10-20 cm) and it is not fully enclosed (e.g. in a cupboard). In order to reduce formation of water vapour it is advisable to have a 20 min pause between loads.

The Euroklav®23-S should never be installed in an enclosed position, and should always have sufficient space around it.

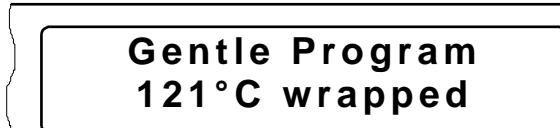
4.12 Manual termination of program

4.12.1 Termination of sterilization

A program can be terminated at any time by pressing the "Start-Stop" button. If the program has not yet reached the drying phase then the items will be **non-sterile**!

Warning! Steam may escape when the autoclave door is opened.

If the sterilization phase of the program had not been completed, then it is advisable to carry out an empty sterilization run before reusing the autoclave.

Operation	Display
1. Press the "Start-Stop" button To confirm, press the "Start-Stop" once again within 5 seconds. If no confirmation is given then the program resumes normally.	 Program Start-Stop
2. If confirmation is given then the program stops. The pressure inside the autoclave will then be equalised by pressure release.	 
3. After pressure equalisation, the display will alternately show the messages "Terminated" and an offer to quit the program termination.	 
4. To undo the program termination, press the " - " button. - Otherwise, After the message "Please wait, Door unlocking", the display for the selected program reappears.	

4.12.2 Terminate drying

A program can be terminated after starting of the program step "Drying", e.g. in case of needing an instrument urgently for use. Since the sterilization has been completed, the items are sterilized at this point. Drying is crucial for sterile storage. Depending on when the drying phase was terminated, in particular in the case of wrapped sterile items, insufficient drying must be expected. We therefore recommend that you do not interrupt the drying process for wrapped items in the "Universal Program" or "Gentle Program".

With the "Quick Program" it may be desirable to interrupt the drying program so that items can be used again. The unwrapped items will dry as they are cooling down.

Warning! If the drying process is interrupted than steam may be released when the door of the autoclave is opened.

Operation	Display
1. The autoclave is in the drying phase. The display shows the drying time alternately with the option to terminate the drying phase	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Stop program Press 'Stop'</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Immediate removal Press 'Stop'</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div>
2. Press the "Start-Stop" button To confirm, press the "Start-Stop" once again within 5 secs. If no confirmation is given then the program resumes normally.	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Stop program Press 'Stop'</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div>
3. If the "Start-Stop" button has been pressed again to confirm then the program terminates.	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Drying stopped</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div>
4. After the ventilation of the chamber the display shows that the program has been successfully completed.: alternately with: If a printer is connected and an immediate report has been selected, this is printed-out, together with confirmation that the drying process has been terminated.	<div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Quick program Run successfully</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Open door please</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div> <div style="display: flex; align-items: center; justify-content: space-between;"> <div style="flex: 1; text-align: center;"> <p>Drying stopped</p> </div> <div style="flex: 1; text-align: right;"> Program Start-Stop </div> </div>

4.13 Reaction to warnings / error messages

The Euroklav®23-S has a number of safety features and an extensive integrated control and monitoring system, in order to ensure the greatest possible level of safety for the sterilization process, and to eliminate risks for the patients and operators.

Various aspects of the operation of the appliance, such as pressure and temperature sensors are automatically checked when the autoclave is switched on.

The power supply, and the quantity and quality of the feed water and cooling water are checked before a program can start.

A successful program start is followed in the next stages by the monitoring of all parameters of relevance for the sterilization. If any limit values for the individual program phases are exceeded then there is a malfunction report and the program is automatically interrupted.

In addition to messages, warnings or malfunction reports on the display, if a printer is connected then a print-out will provide details of the type of malfunction and when it occurred.

If any such warning message occurs then you should consult Section 7, which provides detailed advice and possible operational errors.

4.14 Operational pauses

In general, the door should only be leant to during operational pauses in order to reduce wear on the door seal and to avoid premature failure or sticking.

In the event of longer breaks, such as during vacations, the cooling water supply should be turned off (and the feed water supply from the water purifier if one is connected).

5 Closing down / Transport / Reinstallation

When closing down and transporting the autoclave you should proceed as follows:

- Switch off the power.
- Disconnect from the mains, allow the autoclave to cool down.
- Empty the internal water storage tank
- Turn off cooling water and feed water supplies.
- Disconnect pipes at rear of autoclave.
- If transporting the autoclave with trays and tray rack assemblies in place, then protect the inside surface of the door by including a sheet of foam or similar material.

Warning! To avoid damage use the original packaging when transporting the autoclave.

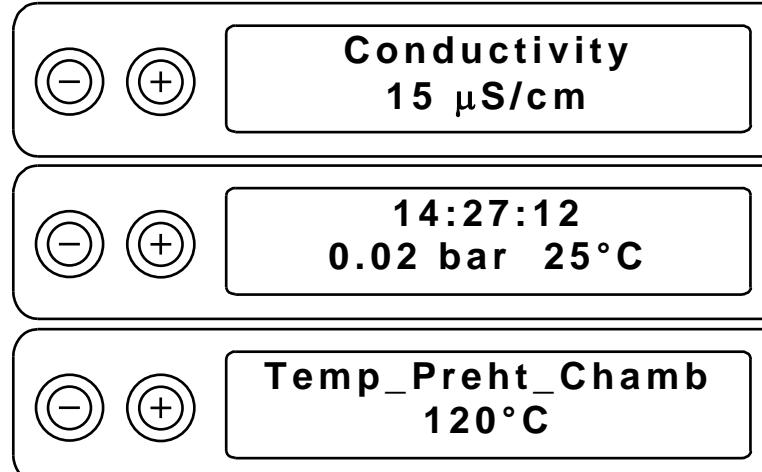
If the appliance may be exposed to frost in transit then follow the relevant service instructions!

- When setting the appliance up for reuse after transport or repairs then proceed in accordance with Sections 2 and 3.

6 Special functions

6.1 Water quality (conductivity) / Chamber preheating temperature

By repeatedly pressing the "-" button, the preheating temperature of the chamber and the conductivity of the purified feed water used for steam generation can be displayed alternately.

Operation	Display message
<p>1. Press down the "-" button to display the conductivity of the feed water $\mu\text{S}/\text{cm}$</p> <p>Release the "-" button to return to the basic display (as shown here) or the program status</p> <p>Press the "-" button repeatedly and hold down: Display shows the pre-heating temperature of the chamber.</p>	 <p>The display shows three rows of information. The top row shows conductivity: "Conductivity 15 $\mu\text{S}/\text{cm}$". The middle row shows time and pressure: "14:27:12 0.02 bar 25°C". The bottom row shows chamber preheat temperature: "Temp_Preht_Chamb 120°C". Each row has a set of "-" and "+" buttons on the left and a "Program Start-Stop" button on the right.</p>

6.2 Selecting extra drying

The standard drying times for the various programs provide adequate drying if the autoclave has been loaded correctly (see Section 4.2). Nevertheless, with certain loads residual moisture may remain. By selecting the "Extra drying" function, the drying time can be extended by 50%:

Operation	Display message
At the start of the program, press the "+" button. The display shows a message confirming the extra drying, and then the program runs as described in Section 4.7, but with 50 % longer drying time.	 <p>The display shows a message "Supplent drying selected" in the center. On the left is a "+" button, and on the right are two "Program Start-Stop" buttons.</p>

6.3 Records / Load documentation

In order to document the progress of the sterilization program, then the processor memory stores records of the last 40 cycles. These records can be downloaded at a later stage via the serial interface (RS232).

When the memory is full (40 program runs) then before the start of the next run the oldest record will automatically be overwritten. If an external printer is connected (and operable) and the option "Immed. print-out? No" has been selected, then confirmation will be requested before the oldest record is overwritten (see Section 7.3).

Hardware details and the nature of the print-out documentation is provided in the following sub-sections.

6.3.1 Record print-out

6.3.1.1 External printer

6.3.1.1.1 Connecting the external MELAprint® 42 printer

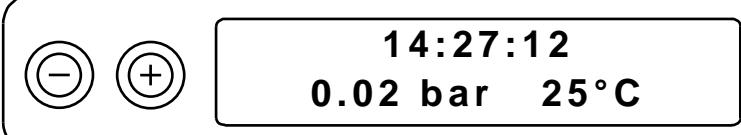
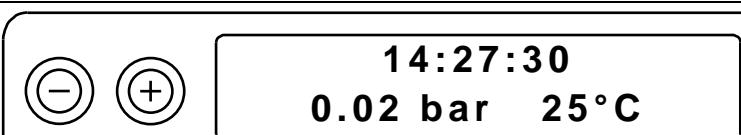
In order to connect a printer to the autoclave then a printer cable should be connected between the 9-pole socket on the front of the autoclave (see page: 4, Fig. 1, Pos. 8) and the 25-pole on the back of the printer (ensuring a good connection and tightening the locking screws).

The power supply to the printer is provided by the power unit supplied with the printer, which connects to the socket on the rear of the printer.

The printer is ready for operation when the voltage lamp "P" shines and the status display (On line/Off line) "SEL". The operating manual of the printer includes further details, including the assembly of an external paper feed, inserting paper, and the general operation of the printer.

6.3.1.1.2 Initialising the printer

After connecting the printer to the autoclave it must be registered with the autoclave processing unit (initialised). Proceed as follows:

Operation	Display message	Program	Start-Stop
1. Switch on autoclave Display shows time, pressure and temperature			
2. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"			
3. Press "Program" button, Select "Print" menu sub-menu "File transmission"			
4. Press "Program" button, Select "File transmission" Display shows current status e.g. "No printer"			
5. Press "+" (or "-") button until display shows "External printer"			
6. Press "Program" button, Confirm the setting, return to "Print" menu			
7. Press "Start-Stop" button, return to the "Function" menu			
8. Press "Start-Stop" button, Quit the "Function" menu and return to the initial display			

6.3.1.2 Connection to an external PC

6.3.1.2.1 Installation

Records and archives can also be kept by using an external PC. This requires a suitable connection between the serial port of the PC and the printer port of the autoclave.

For data transfer and data processing to a PC you must first install the program MELAwin® on the PC.

6.3.1.2.2 Downloading to a PC

After connecting the autoclave to a PC the print-out option for "External PC" must be selected. Proceed as for an external printer (see Section 6.3.1.1.2), but under Point 5 use the "+" or "-" button to select the "External PC" option.

6.3.1.3 No printer

In order to select the option "No printer", proceed as described as in Section 6.3.1.1.2. Under Point 5, however, use the "+" or "-" button to reach the setting "No printer".

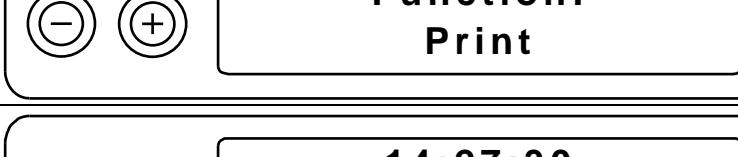
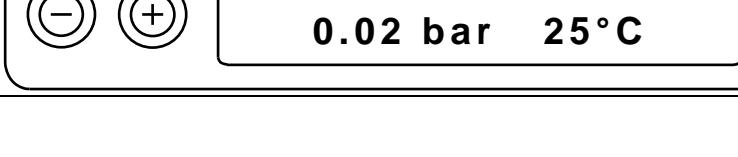
6.3.2 Immed. print-out? Yes/No

When an external printer is fully installed, a print-out can be produced automatically at the end of each program run by selecting the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Function: Print Program Start-Stop </div>
2. Press "Program" button, Select "Print" menu sub-menu "File transmission"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Print File transmission Program Start-Stop </div>
3. Press "+" button, select sub-menu "Immed. print-out?" Display shows current option, here e.g. "No"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Immed. print-out? No Program Start-Stop </div>
4. The button "Program" can be used to switch between "Yes" and "No" Press "Program" button, Select "Yes" option	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Immed. print-out? Yes Program Start-Stop </div>
5. Press "Start-Stop" button, Confirm the setting and return to "Function" menu, sub-menu "Print"	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) Function: Print Program Start-Stop </div>
6. Press "Start-Stop" button, Quit the "Function" menu and return to the initial display	 <div style="display: flex; justify-content: space-between; align-items: center;"> (-) (+) 14:27:30 0.02 bar 25°C Program Start-Stop </div>

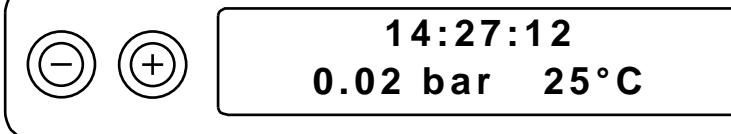
6.3.3 Printing out stored records

When an external printer is fully installed, a print-out of selected records from the memory can be produced by selecting the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the submenu "Print last cycle" appears on the display	
4. Press "Program" button, the cycle record number flashes	
5. To select another number, press the "-" or "+" button until the right number is reached, e.g. here No. 25	
6. Press "Program" button to start the print-out of the selected record, (or to terminate press "Start-Stop" and return to the "Function" menu)	
7. If you wish to print further records then return to Point 4, or...	
8. ... to terminate press "Start-Stop" and return to the "Function" menu	
9. Press the "Start-Stop" button to return to the initial display	

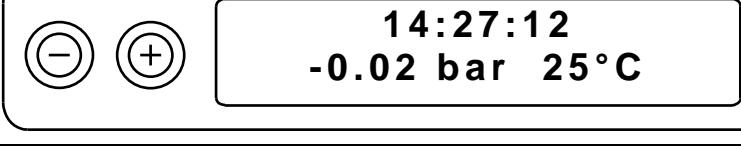
6.3.4 Print all stored cycle records

In order to print-out all stored cycle records (with a fully installed external printer) then select the following options after switching on the autoclave:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the submenu "Print all cycles" appears on the display	
4. Press "Program" button to start the print-out of all the stored records (up to 40!), or to terminate press "Start-Stop" and return to the "Function" menu (Once printing has started termination is only possibly by switching off the power!)	
5. When the print-out is complete, the display again shows the submenu :	
6. Press the "Start-Stop" button to return to the "Function" menu...	
7. ...and then press "Start-Stop" again to return to the initial display	

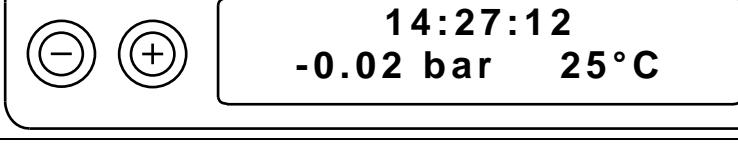
6.3.5 Display printer memory status

With a fully installed external printer, the status of the printer memory can be displayed as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") button until the display shows the memory status, e.g.:	
4. Press the "Start-Stop" to return to the "Function" menu "	
5. and press "Start-Stop" again to return to the starting display	

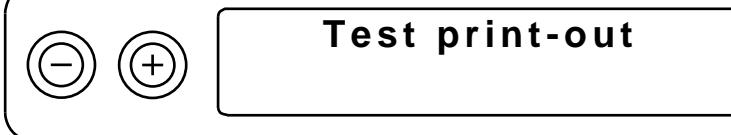
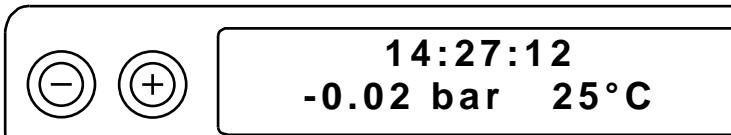
6.3.6 Deleting cycle records

In order to delete cycle records (e.g. in the event of the warning message "Printer memory full", with the option "Immed. print-out? No", selected (see Section 7.3), then after switching on the appliance proceed as follows:

Operation	Display message
1. Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "Data transfer".	
3. Press "+" (or "-") until the display shows "Delete all cycles".	
4. Press the "Program" button to delete all records (or press "Start-Stop" to terminate).	
5. Then press "Start-Stop" to return to "Function" menu ...	
6. ...and press "Start-Stop" again to return to the starting point	

6.3.7 Test print-out

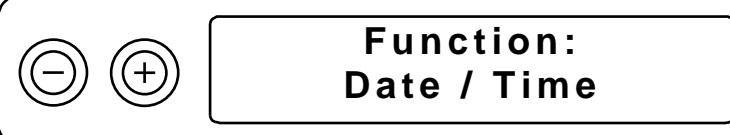
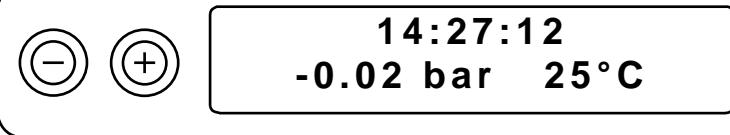
In order to check the printer and its connection to the autoclave, a test print-out can be made as follows:

Operation	Display message
1. Hold down "+" button and also press "-", Select "Function" menu, submenu "Print"	
2. Press "Program" button, Select "Print" menu, submenu "File transmission"	
3. Press "+" (or "-") until the display shows "Test print-out"	
4. Then press the "Program" button for a test print-out (or press "Start-Stop" to terminate)	
5. Then press "Start-Stop" to return to the "Function" menu	
6. and press "Start-Stop" again to return to the starting position	

6.4 Resetting date and time

The date and time can be reset if necessary (e.g. winter time / summer time) as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	 <p>Function: Print</p>
2. Press "+" (or "-"), until the display shows the submenu "Date/Time".	 <p>Function: Date / Time</p>
3. Press "Program", the display shows the current hour (24-hour clock) (here for example 17.00)	 <p>Date / Time Hour : 17</p>
4. by pressing the "+" (or "-") button the following options can be selected	 <p>Date / Time Minutes : 23</p>  <p>Date / Time Seconds : 13</p>  <p>Date / Time Day : 14</p>  <p>Date / Time Month : 05</p>  <p>Date / Time Year : 2000</p>
5. After finding the required option, e.g. "Minute", press the "Program" button and the current value flashes	 <p>Date / Time Minute : 23</p>
6. Press "+" or "-" to increase or reduce the value:	 <p>Date / Time Minute : 28</p>

Operation	Display message
7. Press "Program" to confirm the new value, which then stops flashing. If more adjustment are necessary, return to Point 4 and begin again,	
8. ...or press "Start-Stop" to return to the "Function" menu, and	
9. Press "Start-Stop" again to return to the starting point	

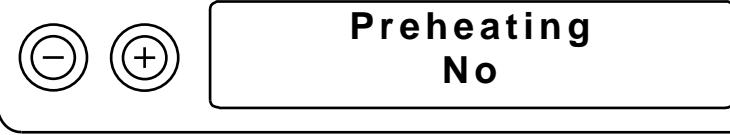
6.5 Automatic preheating

The Euroklav®23-S has a preheating function by means of which the autoclave chamber can be heated to the necessary temperature before a program starts, or can be maintained at this temperature between cycles. This not only shortens the time for each cycle but also reduces condensation on the walls of the chamber which helps to provide very good drying performance.

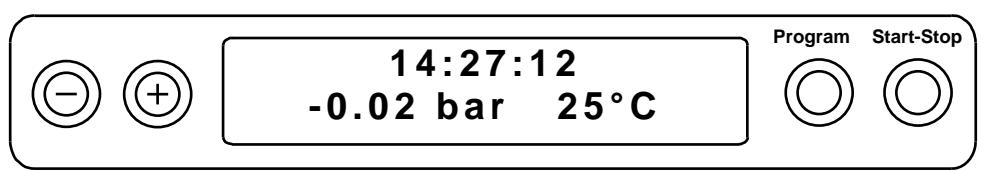
If the automatic preheating is activated, then this begins as soon as the power is switched on.

In the default setting on delivery the automatic preheating is on.

The current setting for the automatic preheating can be changed as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	
2. Press "+" (or "-") until the display shows the submenu "autom. preheating" ..	
3. Press "Program", and the display shows the current option, here "Preheating Yes"	
4. Pressing the "Program" button now alternates between the options "Preheating Yes/No", here e.g. "No"	
5. When the desired option has been selected press "Start-Stop" and return to the "Function" menu, then	

6. ...press "Start-Stop" again to return to the starting point



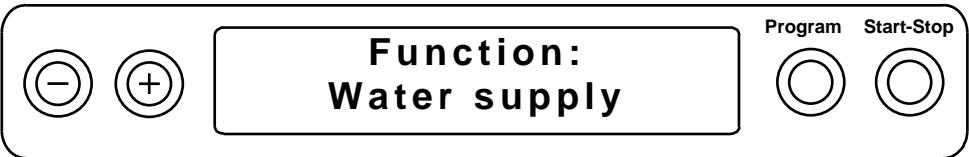
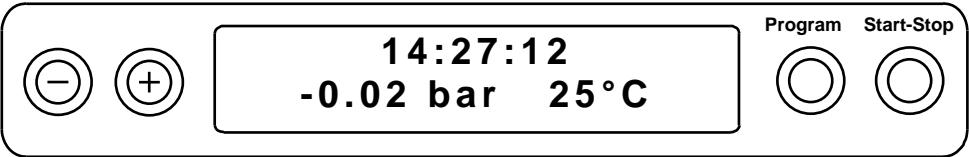
6.6 Total load count

The Euroklav®23-S keeps a running count of the total number of loads sterilized, and this be displayed as follows:

Operation	Display message
1. Hold down "+" button and also press "-", select "Function" menu, submenu "Print"	
2. Press "+" (or "-") until the display shows the submenu "Sum batch number".	
3. Press "Program", the display shows the current total load count, e.g.:	
4. Close by pressing "Start-Stop", and return to the "Function" menu, then	
5. Press "Start-Stop" again to return to the starting point	

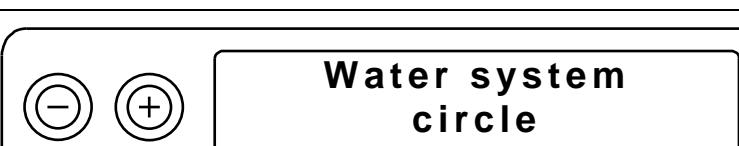
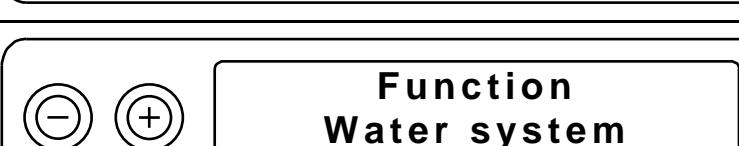
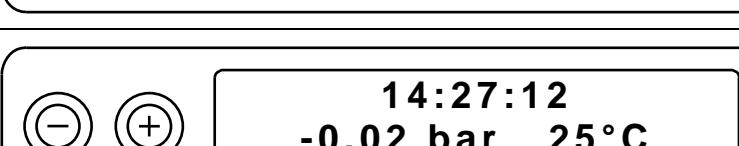
6.7 Distilled / demineralized water supply

The Euroklav®23-S allows a choice between external and internal distilled / demineralized water, the selection being made as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, sub-menu "Print"	
2. Press "+" or "-" button until the display shows the submenu "Water supply".	
3. Press "Program" button, the display will show the current option, here "internal"	
4. Pressing the "Program" button switches between the options "internal" and "external" (press again to return)	
5. When the correct option has been selected, press the "Start-Stop" button to return to the Function menu and ..	
6. Press the "Start-Stop" button to return to the initial position	

6.8 Water-system

The Euroklav®23-S also allows the choice between closed-loop and one-way system. In the closed-loop system the demineralized or distilled water is reused. In the one-way system the demineralized/distilled water is only used once, which is particularly good for the instruments and the sterilizer, but which leads to increased water consumption (approx. 500 ml). The water system is selected as follows:

Operation	Display message
1. Hold down "+" button and also press "-" button. Select "Function" menu, submenu "Print"	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "Function Print". On the right are two buttons: "Program" and "Start-Stop".
2. Press "+" or "-" until the display shows the submenu "Water system".	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "Function Water system". On the right are two buttons: "Program" and "Start-Stop".
3. Press "Program" button and the display shows the current option, here "One way"	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "Water system One way". On the right are two buttons: "Program" and "Start-Stop".
4. Press the "Program" to switch between the option "One way" and "Closed loop" (press again to return)	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "Water system circle". On the right are two buttons: "Program" and "Start-Stop".
5. When the desired option has been selected, press the "Start-Stop" button to return to the "Function" menu and	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "Function Water system". On the right are two buttons: "Program" and "Start-Stop".
6. Press the "Start-Stop" button again to return to the initial position	 A diagram of a control panel. On the left are two buttons: a minus sign (-) and a plus sign (+). In the center is a rectangular display showing the text "14:27:12 -0.02 bar 25°C". On the right are two buttons: "Program" and "Start-Stop".

6.9 Program modifications

The standard programs are designed to meet most practical operational needs (pulsed flow, heating, sterilization, pressure release, drying, and ventilation) and to display the parameters of most interest (pressure, temperature, time).

The operator is responsible for ensuring that the autoclave is not overloaded, and that the load is arranged properly to ensure good drying.

There are two standard options "Automatic preheating" and "Additional drying".

Any further program modification to suit specific individual requirements should only be carried out by authorised personnel, after consultation with your dealer or with the experts at MELAG.

7 Special functions

7.1 What to do if the autoclave malfunctions

If the autoclave does not seem to be working properly (e.g. poor drying, warnings, or error reports) then follow these instructions in order to exclude possible operational errors. ..Following these instructions continue to work with the autoclave. If the malfunction occurs repeatedly then contact our dealer, and authorised MELAG customer service or contact MELAG directly. You should describe the problem precisely and include the works number of your appliance.

7.2 Malfunctions without display messages

7.2.1 No display

After switching on the autoclave, the display should show the initial setting (see Section 4.1.2).

If there is no display: Check:

Exchange the two power fuses (page 4, Fig. 1, Pos. 9) under the switch as follows: Disconnect the power cable and remove the screw cap over the fuses using a screwdriver or a coin. Exchange the fuses (two reserve fuses are on the inside of the door lining) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG-Art. No. 57590).

1. Is the cable plugged into the mains?
2. Is the mains supply OK?: (if necessary check with another appliance).
3. Exchange the two power fuses (page 4, Fig. 1, Pos. 9) under the switch as follows: Disconnect the power cable and remove the screw cap over the fuses using a screwdriver or a coin. Exchange the fuses (two reserve fuses are on the inside of the door lining) then replace the screw cap and reconnect the autoclave to the power supply. If there is still no display when the autoclave is switched on, or if the display blacks out repeatedly, please inform your specialist dealer. If you exchange the fuses, order two new spare fuses through your dealer (MELAG-Art. No. 57590).

7.2.2 Excessive water consumption

The consumption of distilled or demineralized water will vary depending on the program and the load in the autoclave. If much more water is consumed than the amount specified in the Annex (see Section 9.2), then you should:

1. Check that the autoclave has been set up correctly, and is higher at the front, so that condensation can flow out at the back (see Section 2.3).
2. Check that the condensation outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
3. If neither of these measures help to reduce water consumption, please inform your specialist dealer.

7.2.3 Poor drying

Good drying depends only on the correct operation of the autoclave, but also on the way the autoclave is loaded. If drying is not satisfactory:

- 1. Check that the autoclave has been set up correctly, and is higher at the front, so that condensate can flow out at the back.
- 2. Check that the condensation outflow is not blocked by dropped, instruments, filter paper, etc. on the floor of the pressure chamber.
- 3. Check that the maximum load has not been exceeded (particularly for textiles), that the autoclave has been loaded properly (no direct contact with the walls of the pressure chamber), and that the appropriate tray-rack assembly has been used (see Section 4.2).
- 4. Activate automatic pre-heating (see Section 6.5).
- 5. Start with "Additional heating" (see Section 6.2).
- 6. If none of these measures help to reduce water consumption, please inform your specialist dealer.

7.3 Warning messages

For the following warning messages, please observe the comments made and restart the program in question. If the warning occurs repeatedly please consult your specialist dealer.

Warning message	Cause/ Remedy
WARNING! Door open No start possible Acknowledge with button " - "	<p>Door not closed properly</p> <ul style="list-style-type: none"> Press grip down until contact is made (display should then show "Door closed")!
WARNING! no water Refill demin./dist. water No start possible Acknowledge with button " - "	<ul style="list-style-type: none"> This message appears when the supply of demineralized/distilled water is set to "internal", so that water is supplied from the internal tank If the water level in the storage tank (right chamber) falls below the minimum mark the signal will be triggered <ul style="list-style-type: none"> Check the level of water in the tank, and refill to max. with distilled or demineralized water of the appropriate quality
WARNING! no feed water Check supply demin./dist. water No start possible Acknowledge with button " - "	<ul style="list-style-type: none"> This warning appears when the supply of demineralized/distilled water is set to "external". IN this case the water will be supplied from an external water purifier. The internal flow monitor for the demineralized/distilled water supply has not reacted (when filling the steam generator): Supply from MELAdem®47: <ul style="list-style-type: none"> Check the water purifier. If necessary open the water intake tap. If the pressure water storage unit is empty wait approximately 1 hour before restarting the program. If the message reappears repeatedly, have the water purifier serviced. Supply from MELAdem®37: <ul style="list-style-type: none"> Check the water purification system. If necessary open the water intake tap. If the message reappears repeatedly, have the water purifier serviced <p>If the autoclave is being used for the first time or is being restarted after a break then this message may simply be caused by the fact that the tubes were initially empty - just repeat the start procedure..</p>

Warning message	Cause/ Remedy
WARNING!	<ul style="list-style-type: none"> • This warning appears if the wastewater chamber (left tank chamber) is full. • The warning is generated when the water reaches the maximum level in the container.
Wastewater tank Full	<ul style="list-style-type: none"> • Empty the tank as follows: <ul style="list-style-type: none"> • Pull on the left plug on the front of the autoclave and withdraw the emptying pipe as far as possible. • Hold the end of the pipe over a container (min. capacity 5 litre) standing on the floor. pull the stopper out of the pipe and allow the water to drain out. • When all the water has drained away, replace the stopper in the pipe, and push the pipe back into the opening on the front of the autoclave. • The message can then be acknowledged.
No start possible	<p>Conductivity of the demineralized or distilled water is above the first limit value, a start is possible by pressing the "Start" button once more:</p>
Acknowledge with button " - "	<ul style="list-style-type: none"> ▪ For the one-way option <ul style="list-style-type: none"> • Empty water from storage container (right chamber), clean tank with distilled/demineralized water and refill to max. with purified water to specifications ▪ For the closed-loop option <ul style="list-style-type: none"> • Empty water from both chambers of the internal storage tank, clean tank with distilled/demineralized water and refill to max. with purified water to specifications. • Water from the MELAdem®47: The demineralization cartridge in the ion exchanger may be exhausted. Exchange in accordance with the operating manual. • Water from the MELAdem®37: The demineralization unit may be exhausted. Exchange in accordance with the operating manual. • Water from other purification equipment: Exchange the demineralization / deionisation unit in accordance with the manufacturer's instructions. <p>After taking the appropriate steps, carry out the program start. When starting for the first time after exchanging the purified water container, or after maintenance of the water purification equipment, there may be another report because at first the supply tube and /or measuring cell will not have been washed out with fresh, pure water.</p>
Water quality Poor	<p>Conductivity of the demineralized or distilled water exceeds the second limit value - a program start is no longer possible:</p> <p>Proceed as above for "Water quality poor".</p>
Check Feed water quality	
Water quality Bad	
No start possible	
Acknowledge with button " - "	

Warning message	Cause/ Remedy
WARNING!	<p>The pressure for the ventilation drying lies outside the permitted range. The report comes at the end of the program, and as the last line of the print-out:</p> <ul style="list-style-type: none"> • The sterile filter may be clogged or torn. Exchange the sterile filter (MELAG Art. No.: 20160).
Exchange Sterile filter	
Acknowledge with button " - "	
Printer is not ready	<p>Communication with the printer via the serial interface has been interrupted. This message appears when a report cannot be printed out. It is displayed for 20 seconds. If the printer becomes operational during this period the cycle record prints out:</p> <ul style="list-style-type: none"> • The autoclave may be operated without a printer. Check under the "Data transfer" menu that the option "No printer" has been selected. (see Section 6.3.1.3) • Check the cable connection between the printer and the autoclave. • Check the power supply to the printer. In the MELAprint 40 the red light should indicate 'power on' • The printer may be "Offline". Select "online" (MELAprint 40, press "SEL" button, green LED "SEL" should shine)
Printer memory full	<p>The internal printer memory is full (40 cycles recorded), an external printer is registered, and in the "Print" menu the option "Immed. print-out? No" is selected. The message is displayed when a program is started. Pressing the "Start / Stop" button again deleted the message and the program starts:</p> <ul style="list-style-type: none"> • You can continue operations simply by pressing the "Start / Stop" button twice when you start a program. • Select "Immed. print-out? Yes" (see Section 6.3.1.3) • Delete stored records (See Section 6.3.6), if necessary print-out all stored cycle records first (see Section 6.3.4) <p>In the Data transfer menu, select the "No printer" option (see Section 6.3.1.3)</p>
Execute service please	<p>The service message is activated after a certain number of loads, when a service is due. The message appears before the start of every program. If you press the "Start / Stop" button again the message is deleted and the program starts.</p> <ol style="list-style-type: none"> 1. You can continue operations, by simply pressing the "Start / Stop" button twice when you start a program. 2. Have a service carried out as recommended by an authorised MELAG servicing company or your specialist dealer. <p>The cycle counter for servicing should be reset during the service.</p>
WARNING! Battery dead	<ul style="list-style-type: none"> • The monitoring of the internal device battery voltage has determined a too low voltage value. <p>The battery has to be changed by the MELAG service-company/ service.</p>

7.4 Error reports

Errors are generally reported by an "Error" on the display with the number of the error and its short name. Error reports may occur without a program start (when the power is switched on or soon after), or during a program.

If errors are reported during a program, then in addition to the error report the program will also be stopped. This may be accompanied by the equalisation of the pressure in the autoclave, and in this case the error message will alternate with the messages "Pressure release", or "Ventilation", and "End".

After the termination, the display will alternately show the error message and "Quit with "-" button" and then "Terminate End". Pressing "-" deleted the error message (if the error is not permanent). Until you have quit the error message the autoclave door cannot be opened. If a program has been prematurely terminated in this way the autoclave load must always be regarded as being **not sterilized**. We recommend that you unload the autoclave, carry out a sterilization cycle without any load (the drying may be impaired for this first cycle) and then reload the autoclave and repeat the interrupted operation cycle.

If an external printer is connected and "Immed. print-out? Yes" is selected, a record will automatically be printed out at the end of the termination.

The print-out shows the full name of the error, and if a program has been interrupted before completion it will also show "Load not sterile". The following list gives error reports, the cause and possible remedies.

Error report	Cause / remedy
Error 2: Steam Generator	<p>The monitored time was exceeded not only for the heating-up phases during air removal by sub-atmospheric pulsing, but also for achieving the required sterilization pressure. Causes of this error may be any of the following:</p> <ul style="list-style-type: none"> • Maximum loading amounts were exceeded. • Reduced heating output, since the mains voltage was too low. Please check the electrical power supply from the building. Try to see if the device works properly when connected to another electrical circuit. • Loss of water as a result of leaks, or from collection of water in porous materials. <p>Do not allow water to collect in the objects to be sterilized: be sure to turn bowls, cups, glasses, and the like <u>upside down</u> so that their openings are downward. Cassettes perforated on one side must be turned so that their perforated side faces downward. Important: It is not allowed to use cassettes that are completely closed.</p> <ul style="list-style-type: none"> • It is not allowed to sterilize without using tray racks. • After the above possible causes have been eliminated, press the reset button on the device. Symbol:  <p>Important: After pressing the reset button, perform an empty sterilization cycle in the "Fast" program (sterilization with completely empty sterilization chamber).</p> <p>If the problem continues, notify your specialist MELAG dealer specialist MELAG dealer.</p>
Error 4: Pressure release	<p>The monitoring time for the ventilation of the pressure chamber was exceeded.:</p> <ul style="list-style-type: none"> • Check that the pressure releases at the rear of the chamber are not blocked • If this occurs repeatedly, inform your specialist dealer.
Error 8: Time base	<p>Maximum difference between the program duration and the internal clock exceeded:</p> <p>If this occurs repeatedly, inform your specialist dealer.</p>
Error 9: Door open	<p>Door not closed properly</p> <ul style="list-style-type: none"> • Press grip down until contact is made (display should then show "Door closed")! • If this occurs repeatedly, inform your specialist dealer.

Error report	Cause / remedy
Error 10: Steamgen. too hot	<p>The capillary tube level regulator is open at the start of the program (error report immediately after start), or the monitoring time until refilling with demineralized or distilled water during the program (until the end of sterilization) is exceeded:</p> <ul style="list-style-type: none"> • This problem can arise because after stopping a program and immediately restarting - wait for two minutes and try starting again. <p>If this occurs repeatedly, inform your specialist dealer.</p>
Error 12: Door locking	<p>Maximum permissible time for door locking: Check the locking bolt can move freely</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Error 14: No feed water	<p>The flow monitor for the demineralized / distilled water supply does not close during the program (see message "Warning no feed water" - page 34).</p>
Error 18: Sensor: ... Input.: ...	<p>The internal testing of the sensors for temperature, pressure or conductivity showed an excessive deviation, the error can be reported on switching on the appliance or in the course of a program:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Error 21: Pre-heating	<p>The pre-heating has not reached the necessary temperature within the specified time limit: If this occurs repeatedly select the option "Automatic preheating No" and inform your specialist dealer (see Section 6.5).</p>
Error 22: Overheating	<p>The maximum preheating temperature was exceeded:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly start the autoclave without preheating and inform your specialist dealer.
Error 23: Flow	<p>The monitoring time for the pressure release in the outflow process for the fractionating was exceeded:</p> <ul style="list-style-type: none"> • Check that the flow filter in the chamber directly behind the door is not blocked ▪ If this occurs repeatedly, inform your specialist dealer.
Error 26: A/D-conversion	<p>The limit deviation for internal analog/digital signal conversion has been exceeded:</p> <ul style="list-style-type: none"> ▪ If this occurs repeatedly, inform your specialist dealer.
Error 27: Temp. sens. def 1,2	<p>The limit deviation between the two sensors for the steam temperature has been exceeded: If this occurs repeatedly, inform your specialist dealer.</p>

Error report	Cause / remedy
Error 32: Power loss	<p>After starting the program there was a loss of power. The error report is received when the electricity supply is restored:</p> <ul style="list-style-type: none"> Check the mains power supply installation, if no errors can be found, inform the service agent.
Sterilize sterile filter	<p>If there is a loss of power when the chamber is under pressure, then there will be an additional reminder to sterilize the sterile filter, since this may have become moist and non-sterile:</p> <ul style="list-style-type: none"> Remove the sterile filter at the rear of the autoclave. Sterilize the filter using the rapid program. Then replace the filter.
Error 33: Pressure drop	<p>The time limit for the steam generator to reach the necessary pressure has been exceeded:</p> <ol style="list-style-type: none"> If this occurs repeatedly, inform your specialist dealer.
Error 34: Sterilization TU	<p>The minimum sterilization temperature has not been reached:</p> <ul style="list-style-type: none"> Reduce the size of the load. If this occurs repeatedly, inform your specialist dealer.
Error 35: Sterilization TO	<p>The maximum sterilization temperature has been exceeded:</p> <ul style="list-style-type: none"> If this occurs repeatedly, inform your specialist dealer
Error 36: Sterilization PU	<p>Sterilization pressure falls below the minimum level:</p> <ul style="list-style-type: none"> Reduce the size of the load. If this occurs repeatedly, inform your specialist dealer
Error 37: Sterilization PO	<p>The maximum sterilization pressure has been exceeded:</p> <ul style="list-style-type: none"> If this occurs repeatedly, inform your specialist dealer.
Error 38: Sterilization TD	<p>The difference between measured and theoretical temperature is too large:</p> <ol style="list-style-type: none"> If this occurs repeatedly, inform your specialist dealer.
Error 41: Flow drying	<p>The monitoring period for the pressure release in the flow release during drying was exceeded:</p> <ul style="list-style-type: none"> Check that the flow filter in the chamber directly behind the door is not blocked If this occurs repeatedly, inform your specialist dealer.
Error 42: Drying press.-pump	<p>The monitoring time for the pressure increase during pressure drying was exceeded:</p> <ul style="list-style-type: none"> Check that the sterile filter is not blocked, if necessary replace If this occurs repeatedly, inform your specialist dealer.

8 Taking care of your autoclave

8.1 Preparation of instruments

MELAG - rust-free materials

All parts of the Euroklav®23-S which come into contact with steam are made on non-rusting materials: the pressure chamber and the door of stainless steel, steam pipes of Teflon, and screws and magnet-valves of bronze.

Film rust

The use of these materials means that no parts of the autoclave can initiate rust formation. Where rust does attack the autoclave or instruments sterilized in it, tests repeatedly show that this has been brought into the autoclave on instruments (film rust).

Even top-quality stainless steel instruments can form rust if they are not handled properly, e.g. if they are treated with the wrong chemical cleaning or disinfecting agents.

Preparing items for sterilization

The example of the formation of film rust shows how important it is to prepare items properly before sterilization.

Handpieces and contra-angles must be cleaned before sterilization and maintained (e.g. by oiling). Other instruments must be disinfected and cleaned immediately after use in accordance with UVV/VBG 103, or similarly strict national codes of practice in a disinfectant and/or cleaning solution at the correct concentration for the correct length of time

MELAG recommends the use of cleaning aids such as ultrasonic baths, cleaning and maintenance equipment for handpieces for contra-angles, as well as thermo-disinfecting devices.

It is essential that the instruments are well cleaned in order to avoid dirt and contamination being separated from the load in the autoclave and clogging filters, valves, and nozzles. In particular locks, joints, and hinges must be cleaned thoroughly with a brush before sterilization. No traces of cleaning and disinfecting agents should be allowed to enter into the sterilization chamber of the autoclave, since this can give rise to corrosion! The instruments should be swilled off with demineralized water and then dried off before being loaded in the autoclave. Turbines and handpieces must be oiled in accordance with the manufacturer's instructions in order to ensure their long working life.

Brand-new instruments

The cleaning procedures described above must also be followed before sterilizing brand-new instruments. These often carry small amounts of grease, oil and soiling from the manufacturing process.

Important: Carefully follow all instructions provided by manufacturers of instruments for the preparation of their products for first-time sterilization and for subsequent sterilizations.

8.2 Rust formation = Drag-in rust

As already explained, the non-rusting materials used in the autoclave cannot cause rust formation in the autoclave!

Where rust forms this is "drag-in rust". This originates from instruments or other metal items carrying traces of rust, even though they are made of stainless steel, or which are made of normal steel but which have a damaged galvanic coating. Often, a single rusty instrument is enough to pass rust on to other instruments or to lead to film rust forming in the autoclave resulting to corrosion damage. Drag-in rust must be removed from the affected instruments or from the autoclave and tray assembly using a mild commercial cleaning agent for stainless steel. (This should not contain of chlorine).. Do not use steel wool, a wire brush or other abrasive cleaners! Spots can be removed with a damp, lint-free cloth or a cloth with surgical spirits or alcohol.

8.3 Taking care of the Euroklav®23-S

8.3.1 Cleaning

The tray assembly and the autoclave chamber including the contact area of the door gasket and the door opening should be inspected thoroughly at least once a week for signs of damage or soiling. If necessary, wipe out the autoclave chamber using a **lint-free cloth** and surgical spirits. This involves withdrawing the trays and tray guide assembly. Stubborn spots can be removed using small amounts of a mild commercial steel cleaning agent (pH-levels from 5 to 8). Care must be taken to ensure that cleaning agent does not get into the pipes attached to the autoclave chamber. The cleaning agent must not contain chlorine and should not be alkaline. Do not use abrasive cleaning pads, steel wool, or brushes.

Inspect the door seal every week for signs of damage and soiling, and if necessary clean it with a mild commercial liquid cleaning agent (pH-levels from 5 to 8) or with surgical spirits. If necessary, the seal can be removed.

The bolt of the door lock (right side) and the door hinge (left side) must be regularly lubricated with silicone grease (MELAG Art.No. 24355), in order to ensure that the door can easily be locked and unlocked, without unnecessary wear.

The outer parts of the autoclave can be cleaned with a mild commercial cleaning agent or with surgical spirits.

If water is supplied from and returned to the internal tank, then this should be inspected before refilling with distilled / demineralized water. Whenever necessary it should be cleaned. The wastewater tank on the left should be emptied at least every two weeks and washed out with clear mains-supply water. Hard stains and oily residues may have to be removed using a little washing-up liquid and warm mains-supply water with a suitable soft brush, followed by swilling with distilled / demineralized water. Should the right tank need cleaning after a lengthy period of close-loop operation then this should be cleaned in the same way, and also thoroughly swilled.

8.3.2 Use of demineralized or distilled water

Quality requirements

For steam sterilization it is necessary to use high quality distilled or demineralized water.

The water used should at least comply with the specifications in accordance with European standard EN 13060 listed in the table below.

For the operation of the Euroklav 23-S, however, **battery water in accordance with VDE 510** is sufficient, as long as the VDE specifications are strictly adhered to (conductivity on production $\leq 10 \mu\text{S}/\text{cm}^*$, when used $\leq 30 \mu\text{S}/\text{cm}^*$, pH-value identical with EN 13060, evaporation residues analogous).

Where to purchase the water

Battery water in accordance VDE 510 is widely available in large drug stores, supermarkets and do-it-yourself stores at low prices. The necessary purity standards must be expressly detailed on the label, because with insufficiently pure water calcium scaling could form in the steam lines and valves, restricting the operation of the autoclave. Aggressive water ($\text{pH} < 5$ or $> 7,5$) can also lead to damage in the autoclave.

Formation of spots on instruments

The extent to which spots form on the instruments depends on the quality of the water used to produce the steam.

Specifications for water quality in accordance with the EN 13060

Evaporation residue	$\leq 10 \text{ mg/l}$
Silicon oxide, SiO_2	$\leq 1 \text{ mg/l}$
Iron	$\leq 0.2 \text{ mg/l}$
Cadmium	$\leq 0.005 \text{ mg/l}$
Lead	$\leq 0.05 \text{ mg/l}$
Other heavy metals	$\leq 0.1 \text{ mg/l}$
Chlorides (Cl)	$\leq 2 \text{ mg/l}$
Phosphates (P_2O_5)	$\leq 0.5 \text{ mg/l}$
Conductivity at 20°C	$\leq 15 \mu\text{S}/\text{cm}^*$
pH (degree of acidity)	5 - 7,5
Appearance	Colourless; clean; without sediment
Hardness (Σ of ions of alkaline earth)	$\leq 0.02 \text{ mmol/l}$

*) $\mu\text{S}/\text{cm}$ = micro-Siemens per centimetre

8.4 Checking the operation of the autoclave

8.4.1 Safety with automatic monitoring

The electronic parameter control means that all relevant parameters are constantly monitored and compared with standard process data, so that error reports can be made immediately. If a program is completed without problems then on its completion there is an "End" message. The print-out contains a corresponding report. The operator of the autoclave can check the progress of the program at any time by means of the values shown on the display (or after its completion by means of the print-out).

8.4.2 Periodical bacteriological testing (twice a year)

The German industrial standard DIN 58 946 Part 8 Section 3.2 recommends:

"Periodical testing shall be carried out at the place of installation, e.g. at 6 monthly intervals. They shall demonstrate that sterilization is carried out satisfactorily when the operating instruction for the small sterilizer are followed."

Hygiene institutes and regional medical test centres can supply test spores on request and document the results of sterilization on a test form.

8.4.3 Maintenance recommendations

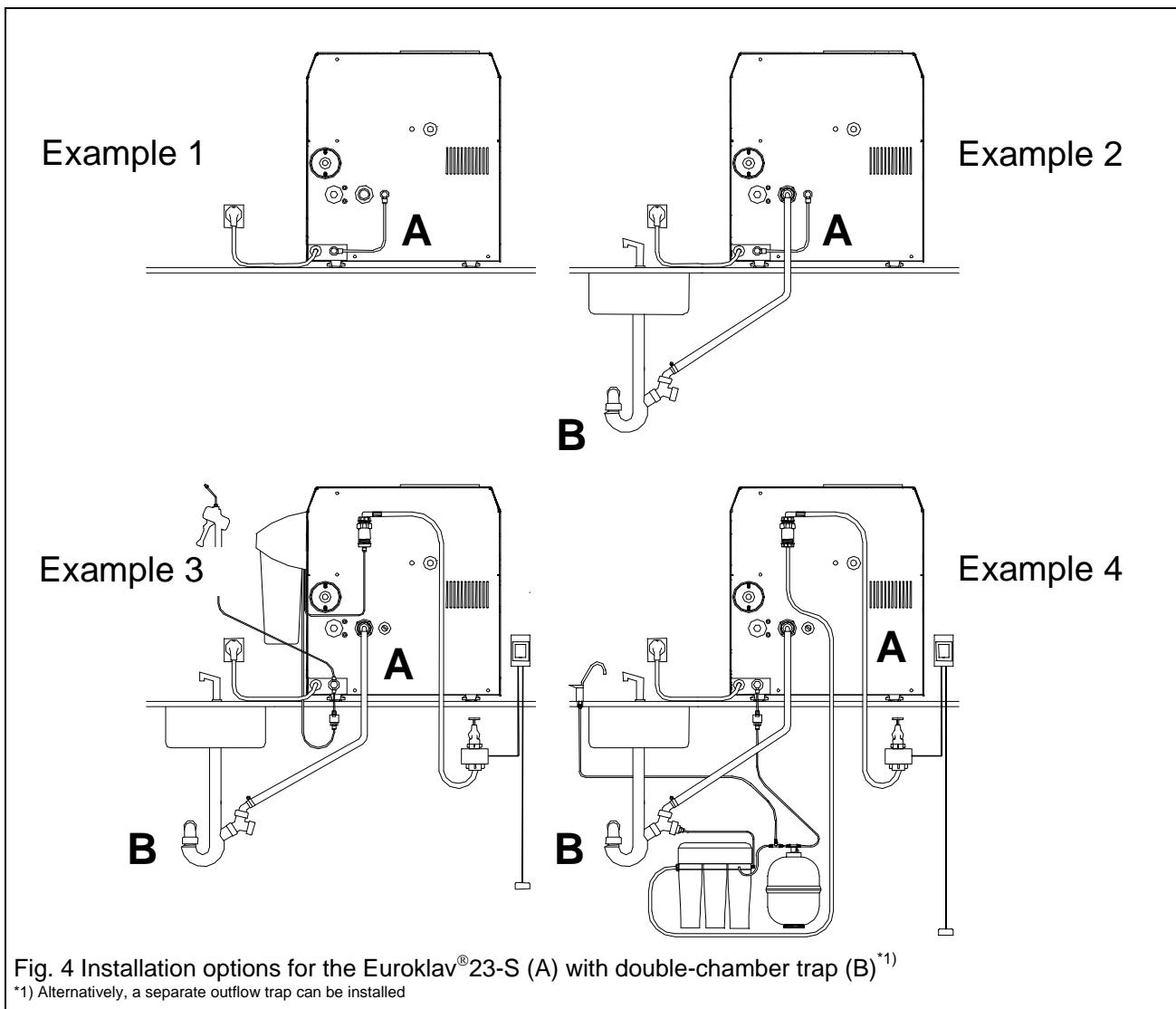
Regular maintenance of the autoclave is important if it is to have a long life and remain in good working order. MELAG recommends that the Euroklav®23-S be serviced annually by a trained technician in accordance with maintenance instructions for this autoclave. The annual service includes a visual inspection and a test of operational functions. As well as all essential components and electrical elements, parts are also inspected for wear and replaced as necessary.

A maintenance reminder appears on the display after 1000 sterilizations.

Consult your dealer of the MELAG Customer Service if you have any questions relating to servicing and maintenance.

9 Annex

9.1 Installation options



Example 1

Euroklav®23-S (rear view), basic version
 Water supply be means of internal double chamber storage tank

Example 3 EN1717

Euroklav®23-S (rear view) with installed
 MELAdem®40 and MELAjet®
 Double chamber trap
 Leak detector with stop valve (optional)
 MELAdem®40
 MELAjet® (optional)

Example 2

Euroklav®23-S (rear view) with one-way water outflow installed
 Double chamber trap

Example 4 EN1717

Euroklav®23-S (rear view) with installed
 MELAdem®47
 Double chamber trap
 Leak detector with stop valve (optional)
 MELAdem®47

9.2 Additional technical data

9.2.1 Capacity/Weight

Weight (unloaded)	43kg
Chamber volume	22 litres
Maximum load	4 kg instruments or 0.6 kg textiles
Loading options:	Mount "B" for max. 4 standard tray-cassettes or 4 MELAG-trays Mount "C" for max. 3 standard tray-cassettes or 6 MELAG-trays MELAG - Sterilization containers: 28MG, 23R,M,G, 15K,M,G, 17K,M,G,R, Foil holder

9.2.2 External supplies

Electric power supply	
Mains supply	230 V AC, 10.4 A, 50...60 Hz
Rating	3000 W; 16 A fuses, circuit breaker 30 mA
Distilled / demineralized water	Distilled or demineralized water in accordance VDE 0510

9.2.3 Operational parameters

9.2.3.1 Programs / Operation times

Program	Operation time (without drying) ^{*)} :		Drying time:
	Warm start/ low load	Warm/ max. load	
"Quick program unwrapped" (134°C, 2bar)	13 min	17 min	12-15 min
"Universal program" (134°C, 2bar)	20 min	22 min	22-26 min
"Gentle program" (121°C, 1bar)	32 min	35 min	27-30 min
"Prion Program" (134°C, 2bar)	35 min	52 min.	15 min.
"Bowie&Dick" (134°C, 2bar)	22 min	23 min	5 min

9.2.3.2 Energy / Water consumption ^{*)}

"Pre-heating"	
Warming up to pre-heating temperature (134°C)	ca. 0.14 kWh (= x € ¹⁾)
"Stand by" mode/ hour	ca. 0,22 kWh (= x € ¹⁾)
Program + drying	0.33 kWh (= x € ¹⁾) for "Quick Program", warm start, low load, to 1.3 kWh (= x € ¹⁾) for "Gentle program", cold start, full load
Consumption of distilled / demineralized water	450 ml (= 4,5 cent ²⁾) for "Quick program", 600 ml (= 6 cent ²⁾) for "Universal program" and "Prion Program" 650 ml (= 6,5 cent ²⁾) for "Gentle program"

^{*)}These values are valid for a constant power supply of 230V.

1) x = energy consumption in kWh x price for one kWh in €/kWh

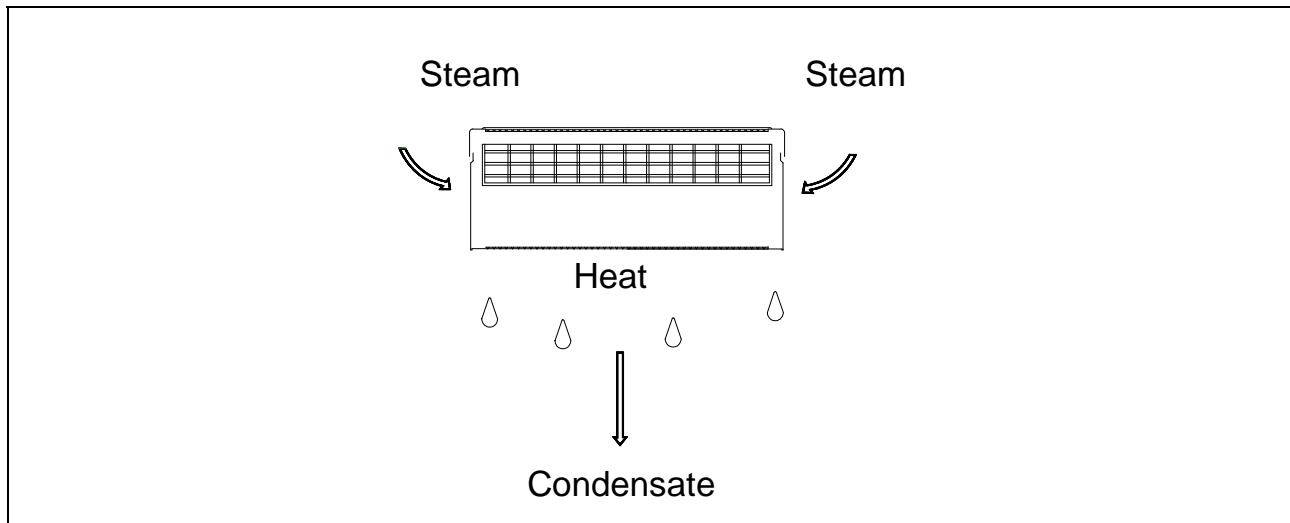
2) Based on a price of € 0.10 per litre distilled water from the MELAdest 65

9.3 Instructions on drying

The Euroklav®23-S provides very good drying standards for sterilized items. Particularly difficult drying tasks (e.g. double wrapping) can also be dried to very good standards with the help of the supplementary drying function and the automatic pre-heating (see Sections 6.2, 6.5). Please read the following sections, which may help you to optimise your drying results.

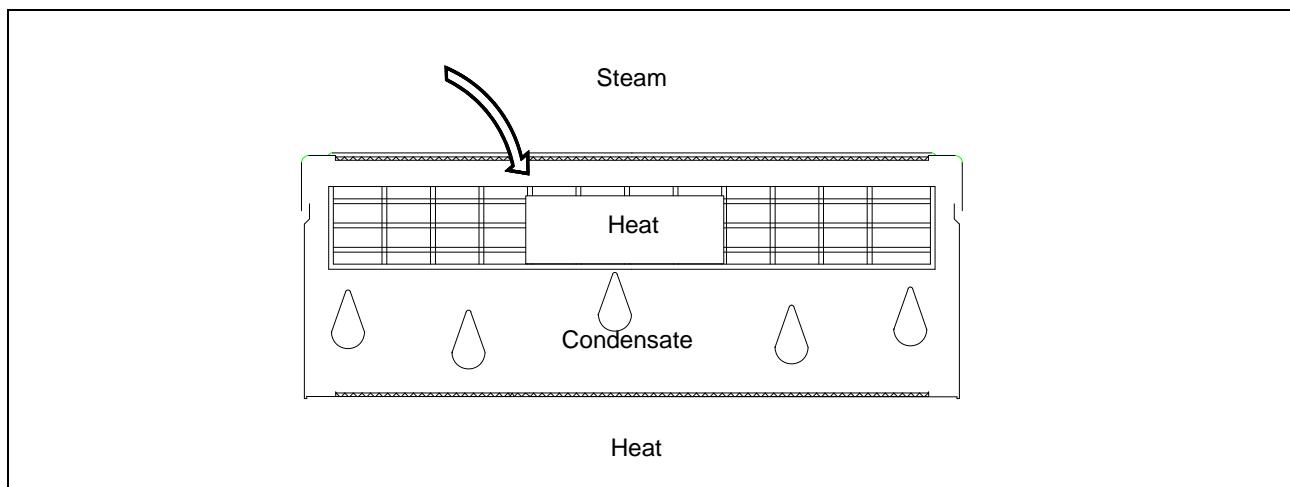
9.3.1 Drying in sterilization containers

In the autoclave steam is produced by heating water. The steam transfers heat to the instruments and sterilization container and warms these. This leads to steam condensing on the instruments and containers.



Formation of condensation on the sterilization container

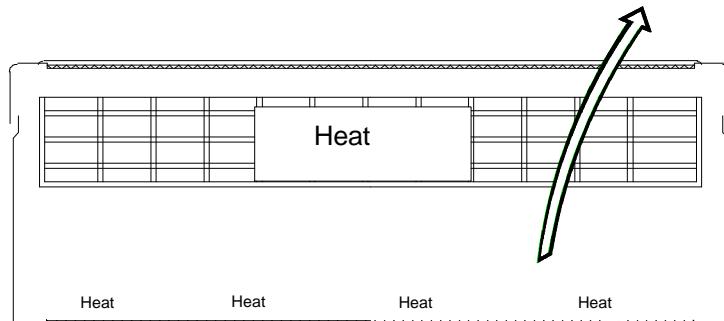
The steam also heats the objects contained in the sterilization containers. Condensation forms on the objects being sterilized, and some of the condensation drops to the bottom of the sterilization container.



Formation of condensation on sterilized objects

After sterilization, during the drying phase, all the condensation must evaporate from the sterilization container and from the sterilized items themselves. This is achieved by the transfer to the condensate of heat stored in the walls of the sterilization container and in the sterilized items themselves. It is preferable that the sterilization container be made of aluminium, as this metal stores and conducts heat well, ensuring faster drying than other materials.

Condensate+Heat=Steam

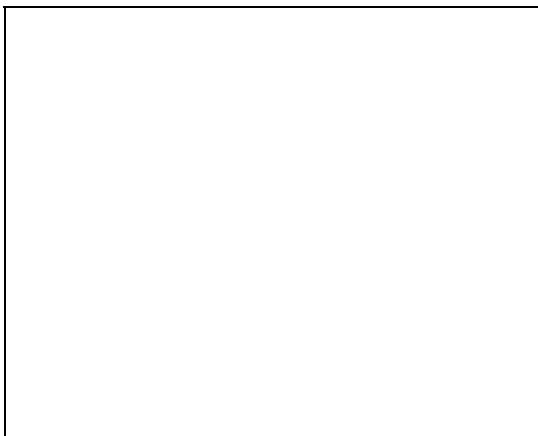


Drying

For good drying it is essential that surplus heat be transferred to the objects which have been sterilized. In addition, the condensation must be led out of the sterilization containers. The floor of the containers have channels and the lid has an arched filter area.

9.3.2 Textiles

When preparing textiles for treatment in the autoclave, care must be taken that the folds in the textiles are arranged in parallel, and that the items are packed side-by-side. This vertical configuration ensures that channels can form between the textile folds for the air to flow out and steam to flow in. Do not stack textiles on top of each other as this hinders the penetration of steam into the packages of textiles.



Loading textiles properly

When loading sterilization containers with textile items, care should be taken to ensure that they retain their vertical orientation, but that the items are not squashed together. This would prevent the formation of flow channels for air and steam. If the packages of textiles cannot be kept upright, then it might be advisable to wrap them in sterilization paper.

The textiles must not touch the sides or the base of the sterilization container, since they might become saturated with condensate.

For good drying results, the textiles should also be as dry as possible when they are placed in the autoclave. The heat stored in the chamber and sterilization container may not otherwise be sufficient to evaporate both the moisture and the condensation.

9.3.3 Instruments

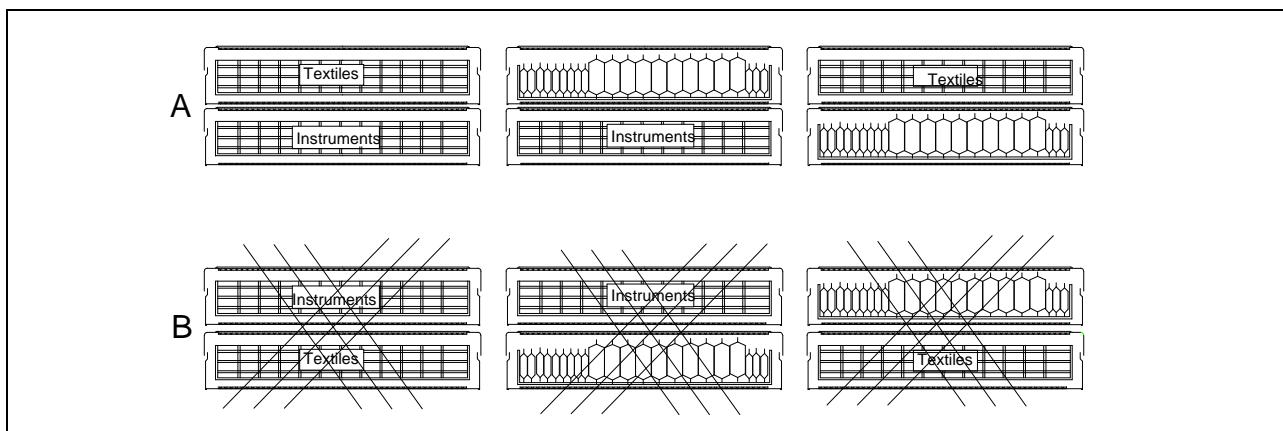
Where appropriate, instruments should be disassembled before placing them in the autoclave, as this will improve the drying results.

The use of lubricants (such as instrument oil) should be avoided unless absolutely necessary. Prior confirmation should be obtained from the manufacturer of such agents that they are in fact suitable for steam sterilization. Substances which are hydrophobic or impenetrable for steam can not only lead to poor drying results, but may also mean that the steam sterilization is unsuccessful, since not only the instruments are protected but also micro-organisms..

9.3.4 Loading the autoclave

Textiles and instruments should not be sterilized together in one sterilization container. Textiles and instruments in separate sterilization containers should as far as possible not be sterilized in the same load. However, where this is unavoidable for economic or other reasons, the following rules should be observed:

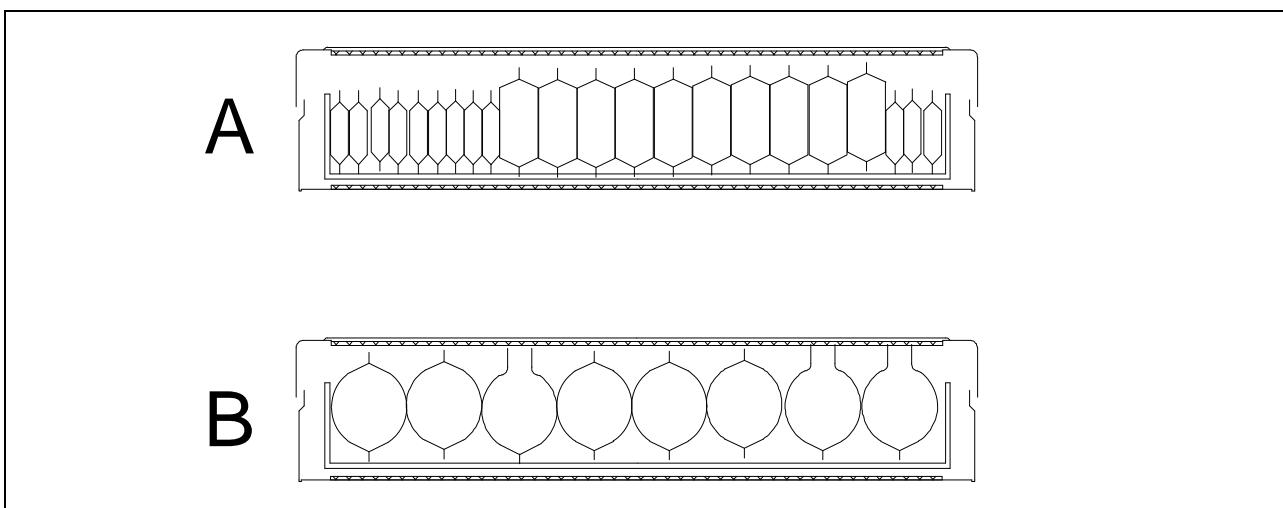
- Instruments and sterilization containers should be placed at the bottom
- Textiles should always be placed at the top
- Transparent sterilization packages and paper sterilization packages should be placed at the top (except when in combination with textiles, in which case they must be at the bottom).



Loading the autoclave

9.3.5 Loading containers with soft sterilization packing material

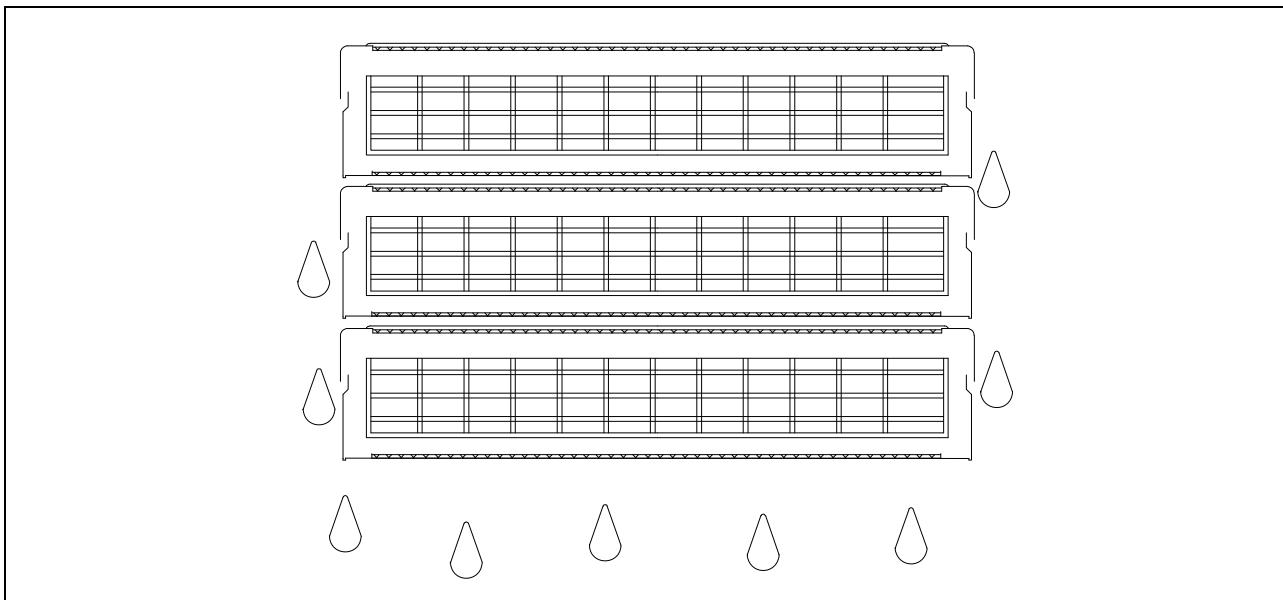
"Soft" sterilization packages such as paper bags or transparent sterilization packages can be sterilized either in sterilization containers or sterilization baskets. To enable better drying, arrange such soft sterilization packages side-by-side and close to each other. This allows condensation to run off the packages, while at the same time preventing them from expanded excessively, and possibly bursting at the seams.



Packing "soft" sterilization packages in sterilization containers

9.3.6 Stacking sterilization containers

When arranging sterilization containers, care should be taken that drops of condensate do not wet items being sterilized beneath, but can flow away to the base of the chamber. The best arrangement is a stack of sterilization containers of the same size, so that condensate can flow down the sides.



Stacked sterilization containers

9.3.7 Removing the sterilized items

Immediately after the sterilization process, some condensate may remain on the sterilized items. However, heat transfer from the sterilized objects can evaporate this after the sterilization process has been completed.

The German standard DIN 58953 Part 7 Section 7 comments on residual moisture on paper bags or transparent sterilization paper after sterilization:

"...Small amounts of water on the surface of packages do not represent a cause for concern if they dry completely within thirty minutes after removal from a steam sterilization system...."

9.3.8 Improving the drying

The drying can be improved by the following measures:

- Pre-heating the autoclave (empty sterilization)
- Arranging transparent sterilization and paper packing vertically
- Selecting the program option "Additional drying"
- Extending the drying times (please consult your MELAG customer service).