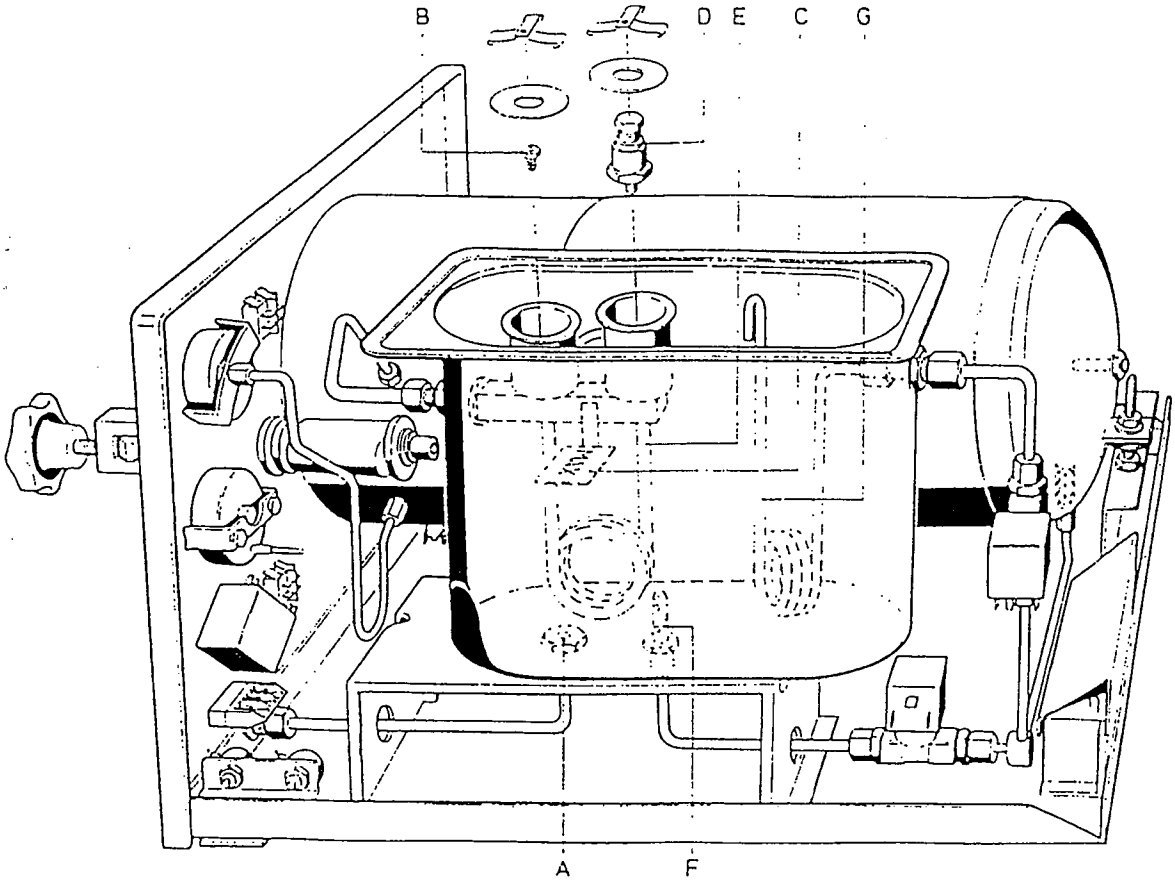
Operating Instructions

MELAG Autoclaves

Type

15 · 17 · 23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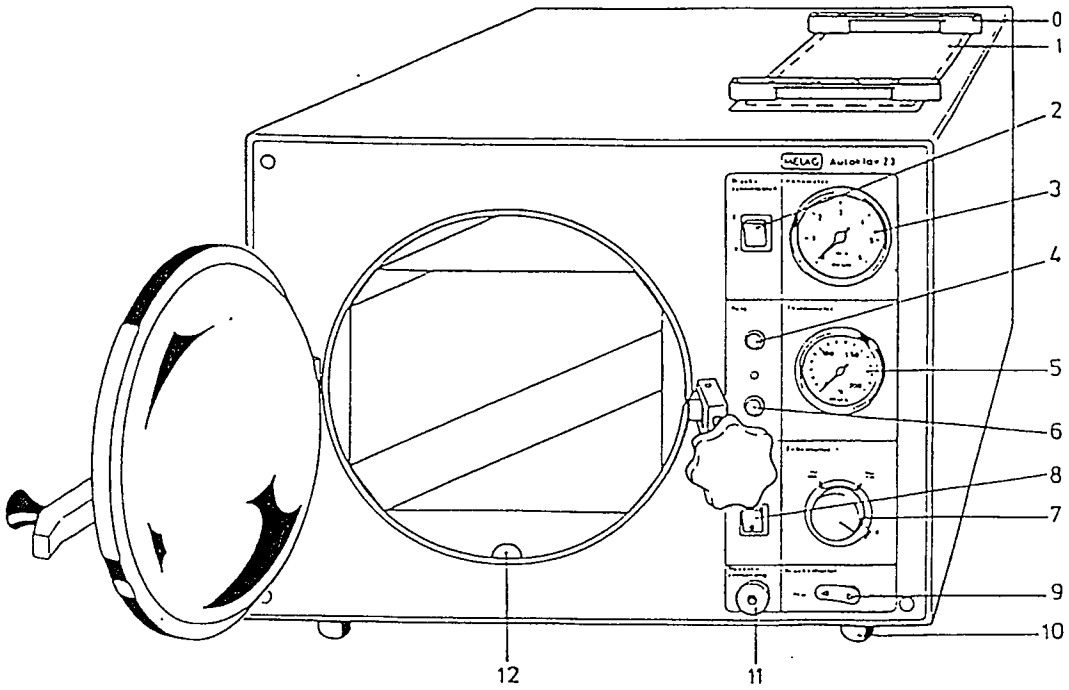
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Operating Instructions for MELAG Autoclaves

IMPORTANT INTRODUCTORY NOTE:

The functional effectiveness of MELAG Autoclaves, as well as the preservation of their value, will depend on the following factors:

1. The proper preparation of the objects before they are sterilized

2. Prevention of the formation of rust film

3. Careful and proper care and maintenance of the equipment, and the regular exchange of distilled water.

1. Preparation of the instruments to be sterilized

All parts of MELAG Autoclaves which come into contact with steam consist of non-rusting materials: the pressure vessel (boiler) and the distilled-water storage tank are made of stainless steel, steam piping is copper, and the tray racks are chrome-plated brass or stainless steel. The trays are made of anodized aluminum.

The use of these materials makes it impossible for rust to originate from within the MELAG Autoclaves themselves. In any cases in which we have observed that rust has entered these autoclaves or the material being sterilized, tests have in all cases revealed that this rust originated from sources outside: from the instrumentarium placed into the autoclaves for sterilization. We must emphasize here that it is indeed easily possible for rust to develop on such items, even on the

stainless steel instruments made by well-known German manufacturers. Such rust is often the result of improper treatment of the instruments with chemical cleaning and disinfecting agents.

This example of rust which enters the autoclaves from the outside shows how important it is to properly prepare objects to be sterilized before they are loaded into MELAG Autoclaves. It is therefore essential that operators of these units by all means observe the instructions given below:

- It is most important that the instrumentarium be properly cleaned before being placed into the autoclaves. If not, particles of dirt or other debris may easily be separated from the instruments during the sterilization, and clog the nozzles and valves of the autoclave.

- Be especially careful to use a brush to thoroughly clean the latches, articulated joints, and hinges of objects before sterilizing them.

- Brush the instruments off thoroughly under running water to completely rinse off all chemical cleaning agents or disinfectants, before placing them into the autoclave. Any cleaning agent or disinfectant which gets into the autoclave will cause corrosion there.

- Dry the instrumentarium thoroughly before placing it into MELAG Autoclaves.

IMPORTANT NOTE:
The user must follow the instructions given above even for brand-new instruments which have never been used. Instruments coming straight from the factory are often contaminated from

their production processes with small residue of oil, grease, and fat, which must be removed before sterilization.

Maintenance of the autoclave

The autoclave pressure vessel must be cleaned at least once a week. Before cleaning the pressure vessel, first remove the trays and then the tray racks, out toward the front of the autoclave. Then thoroughly wipe out the vessel with a soft cloth or sponge. If stubborn spots are difficult to remove, we recommend the use of cleaning agents especially designed for stainless steel. We recommend the German brand Sidol, or an equivalent. When cleaning the pressure vessel, be careful not to allow any soiling or dirt to enter the piping which enters the autoclave vessel.

Once a month, drain the distilled water from the water storage tank by opening the drain plug [11]. Then fill the tank with new distilled water.

Autoclave Type 15

Technical data

Dimensions of the sterilization chamber (diameter x depth)	15 x 38 cm
Sterilization capacity (including the trays)	2 kg
Electrical ratings	1.530 W, 230 V AC
Water quantity per sterilization cycle	280 ccm
Pressure range for 2-bar program	2,0 bar (134°C) ... 2,5 bar (138°C)
Operating time for 2-bar programm	30 min

Note :The operator must take into account that a waiting time of 30 minutes must be observed between two sterilization cycles.

Autoclave Type 17 - Type 23

Technical data

	Type 17	Type 23
• Dimensions of the sterilization chamber (diameter x depth)	18 x 38 cm	23 x 45 cm
• Sterilization capacity (including the trays)	3 kg, or 200 g of textiles	4 kg, or 500 g of textiles
• Electrical ratings	1,200 W 220 V AC	1,800 W 220 V AC
• Water quantity per sterilization cycle	300 ccm	300 ccm

• Pressure range for 1-bar program	1.0 bar (121°C) ...	1.4 bar (126°C)
• Pressure range for 2-bar program	2.0 bar (134°C) ...	2.5 bar (138°C)
• Operating time for 1-bar program	50 min	50 min
• Operating time for 2-bar program	30 min	30 min

Note: The operator must take into account that a waiting time of 30 minutes must be observed between two sterilization cycles.

Important instructions taken from currently valid VDE regulations:

MELAG Autoclaves are not intended or suitable for operations in areas which are subject to explosion hazards.

MELAG Autoclaves may be repaired only by the manufacturer, or by a specialist company or repairman (specialized dealer or customer service organization) who is expressly authorized by the manufacturer for such work.

Important maintenance instructions:

Make sure that the spindle of the door latch is always kept well greased.

A Drain of the storage tank for distilled water
B Vent nozzle
C Maximum water-level mark (MAX)
D Safety valve

E Cooling coil (of the vent nozzle)
F Dirt filter (upstream of the water supply side)
G Cooling coil (for quick pressure release)

2. Filling of the water storage tank before putting into operation

1. Remove the cover [1] from the enclosure of the autoclave, and take off the lid of the water storage tank.

2. Fill the tank with approx. 3 liters of distilled water. Be careful not to fill the tank over the MAX level mark [C]. This is because the valve block with the vent nozzle [B] and the safety valve [D] must be out of the water: if they are not, the autoclave will not reach its proper pressure level.

To ensure that the outflowing steam properly condenses, to avoid unnecessary disturbance from the steam, and to prevent excessive consumption of distilled water, the cooling coil of the vent nozzle [E] and the cooling coil for quick pressure release must be well covered by the water. For this reason, the operator must promptly replenish the consumed distilled water as required or, even better: replace the distilled water as necessary (see instructions on the proper replacement intervals under Section 6.2 below).

0 Grate for supporting trays and similar objects to be sterilized
1 Enclosure cover
2 Control button for quick pressure release
3 Pressure gauge
4 Signal lamp for electric power supply
5 Thermometer

6 Signal lamp for heating system
7 Timer switch
8 Switch for water feed
9 Pressure selection switch
10 Adjustable feet for the autoclave
11 Drain for replacing the distilled water
12 Inspection and access cutout for water filling

3. Leveling the MELAG Autoclave when first putting it into operation, or when changing its location

Your MELAG Autoclave features a direct water filling system. This convenience for the operator requires, however, that the autoclave be set up on a surface which is completely horizontally level. The pressure vessel is installed in the autoclave at a certain angle of slope to the rear, so that the inflowing distilled water becomes visible at the inspection and access cutout for water filling [12] only after the required amount of water has flowed into the pressure vessel.

If, however, the surface onto which the autoclave is set up is sloped toward the front, then the following difficulty will arise: the distilled water will become visible too soon at the inspection and access cutout for water filling, at the front in the pressure vessel, and will give the false impression that enough water has been filled before this is actually the case. The result is that insufficient distilled water will be in the autoclave, and that the prescribed pressure of 2 bar will not be achieved and maintained constant for the required period of approx. 7 minutes. Or, the required pressure of 1 bar will not be achieved and held constant over the necessary 20 minutes.

If, on the other hand, the autoclave is set up on a surface which slopes toward the rear, then the water level will become visible at the inspection cutout when more water than required has flowed into the pressure vessel. This means that the distilled water not consumed during sterilization will remain in the pressure vessel. This will not be harmful for the functioning of the autoclave, however.

To ensure that MELAG Autoclaves have been properly set up and aligned, we deliver a graduated test beaker with each unit. The autoclave has been correctly set up and leveled if the following amounts of water have been filled in at the front, from the test beaker, and if the water level is visible in the inspection and access cutout for water filling [12] at the tray rack:

Following amounts will become visible if the autoclave is properly leveled:

Type 17: 300 ccm Type 23: 300 ccm.

If the autoclave is not level, use the adjustable front feet of the unit [10] to raise or lower the front end as necessary.

4. Instructions for all sterilization procedures

The MELAG Autoclaves may not be operated without the MELAG tray rack (a box open at its front and rear). If the autoclaves are operated without this rack, danger of overheating will arise from the radiant heat produced in the pressure vessel. Any trays, containers (with or without lids), or other supports placed onto the racks to hold the sterilized objects must be perforated with properly sized holes.

The objects to be sterilized can also be sealed into clear sterilization packages. We recommend MELAFOL packages, which have a combination of paper and plastic sheeting. When using these packages, be sure to follow the following instructions:

- Make sure that the paper side of the sealed packages faces downward on the trays.

- Do not stack the packages on top of each other on the sterilizing trays: place the packages only one at a time, next to each other.

- To ensure that the sealed packages properly dry, we recommend that several clear-plastic sterilization packages be lined up in a MELAG package holder (MELAG order no. 283). This holder will ensure that several packages are properly lined up for drying like cards in a card catalog. This item is not available for use in MELAG Autoclave Type 17.

- When sealing the objects inside the sterilization packages, make sure that the sealing seam has a width of at least 8 mm in accordance with DIN 58 953, Part 7. The MELASEAL package sealing device seals such plastic bags in accordance with these DIN regulations (with a sealing seam of 10 mm).

Follow the sequence listed below for all sterilization procedures with MELAG Autoclaves:

1. Set the red non-return (slave) pointer of the pressure gauge [3] to "0". This pointer will later stop at the maximum pressure reached.

2. Set the pressure selection switch [9] to 1 bar or 2 bar, depending on the type of objects to be sterilized. Use the following guidelines:

   - Setting of 1 bar (= 120°C): for rubber, textiles, and the like

   - Setting of 2 bar (= 134°C): for metal, glass, and the like.

3. Place the objects to be sterilized on the trays or other supports, and shove them into the autoclave. Make sure that the objects are loosely distributed (not crowded, and not stacked) on the trays. Do not tightly fold textiles before placing them in the autoclave, and do not press textiles together in sterilization packages. Do not place more textiles in the autoclave than given above in the rating limits for the two autoclave types (200 g for Type 17, and 500 g for Type 23).

4. Set the switch for the water feed [8] to "I". When the water becomes visible at the inspection cutout [12], then set this switch back to "0".

5. Set the timer switch [7] to the 30-minute mark, or to the 50-minute mark, according to the sterilization pressure already set on the pressure selection switch [9]. If you have selected the 1-bar program, set this timer for 50 min. If you have selected the 2-bar program, set the timer for 30 min.

   The electric power is now switched on, and signal lamps [4] and [6] will light up. The electronic temperature control system of the autoclave will automatically regulate the heating system and, as a result, the temperature

and the pressure. The white signal lamp "Heating" [6] will go on and off in accordance with the control system operation.

6. Close the door by tightly bolting it shut.

7. When the time set on the timer switch [7] has run out, the electric power will automatically switch off, and the signal lamps [4] and [6] will go out.

8. The pressure drop to "0" will take place automatically. If the operator presses the control button for quick pressure release [2], the pressure will immediately fall to "0".

   To enable better drying of the objects inside: After the white pointer of the pressure gauge [3] has reached "0", open the door partly, and leave it partly open to allow the heat from the pressure vessel to aid the post-drying process.

   IMPORTANT: Do not open the door before the white pointer of the pressure gauge [3] has returned to "0".

Monitoring of the sterilization sequence

The red non-return (slave) pointer [3] will remain at the maximum pressure reached. This maximum pressure must be the same as the pressure set on the pressure selection switch [9].

5. Total operational time (sterilization cycle time)

Operational time:	At 1 bar (120°C)	At 2 bar (134°C)
	50 minutes	30 minutes

After the timer switch [7] has been set to the marking for 1 bar or 2 bar, the operational time sequence runs fully automatically to the end of the cycle (power cutoff and pressure reduction), without any further manual intervention by the operator.

The overall operational time must be considered as the total turnover time required for all operations involved, i.e., the sterilization cycle time. This overall operational time includes the following individual sub-sequences: heating-up time, venting time, rise time, and sterilization time. The sterilization time, in turn, is composed of the compensation time, the killing time, and the safety-factor time.

The operational time as given above must always be observed, regardless of whether sterilization is carried out from a cold start or from a start with an already hot machine. These full times are necessary to ensure the venting of the pressure vessel required for sterilization, which is the prerequisite for guaranteeing the availability of saturated steam. Air venting takes place through the vent nozzle [B] and always requires a certain fixed time to take place.

6. The use of distilled water

The use of distilled water is absolutely necessary for steam sterilization for the following reasons:

a. Calcium deposits from water which is not distilled will impair the functional effectiveness of the steam piping, the valves, the vent nozzle, and -- in turn -- the entire autoclave itself.

b. The degree to which spots are formed on the sterilized instruments will depend on the quality of the medium (water) used for steam production.

6.1 How much water is comsumed during one sterilization cycle?

During every sterilization cycle, a certain amount of distilled water will be lost from the water storage tank. This water loss will result from the amount of steam which has not completely condensed. The exact amount of water losses will depend on the following factors:

a. The time intervals between sterilization cycles. If sterilization is continuously carried out, without intervals between the cycles, the distilled water in the storage tank will already be hot from the previous cycle, and not all of the steam flowing out of the pressure vessel will condense. A certain share will be lost from the water storage tank.

b. Prompt replenishment of distilled water. If the operator waits too long before replenishing the lost water, and if the water level in the water tank falls so low that it no longer covers the cooling coils, then here as well the steam flowing out will not be completely condensed. The water in the form of this steam will therefore be lost.

6.2 When should all the distilled water in the tank be exchanged?

The degree of purity of the distilled water in the water tank will depend on how thoroughly the instruments have been cleaned before sterilization.

The operator must regularly check the distilled water for purity. If any of the following conditions are found upon inspection, then the distilled water must by all means be replaced, and the water tank must be cleaned:

- If impurities are found in the water
- If the water becomes murky (unclear)
- If a film is found on the surface of the water
- If a coating of impurities forms on the walls and bottom of the water tank.

If grease deposits are found on the walls of the water tank, we recommend filling the tank with hot water which contains a grease-dissolving additive: we recommend the German product Pril or an equivalent. Then clean the tank with a bottle brush. Rinse thoroughly with clear water.

6.3 Draining the distilled water storage tank

To drain the water tank, open the drain plug of the drain cock [11] by turning in a counterclockwise direction. Then allow the dirty water to drain into a container.

Screw in the drain plug [11] again and fill up the water tank up to the marking MAX [C] with distilled water (approximately 3 liters).

7. Ensuring that the sterilized objects are dry upon removal

To ensure that the sterilized objects are always completely dry when the sterilization process is completed, first wait until the pressure has completely reduced. Then, when the pressure-gauge pointer points to "0", immediately open the door and leave it slightly open. The heat from the autoclave will then completely dry out the objects inside. To speed up the proccess of pressure equalization, press the control button for quick pressure release [2] immediately after the autoclave has switched off.

Experience has shown that it helps to place a sheet of filter paper on the trays, under the objects to be sterilized. Then place a second sheet of filter paper over these objects. Do not use impregnated woodpulp paper, cheesecloth, gauze, or any similar materials for these purposes. They contain substances which will be dissolved out by the steam and deposited on the sterilized objects in the form of spots and stains.

8. Formation of rust from outside sources

As was explained at the beginning of these instructions, rust cannot form from sources on or inside MELAG Autoclaves.

Any rust which develops in sterilization operations here will therefore come from outside the autoclave. Such rust will come from the sterilized instruments, or other metal objects to be sterilized, even though they may be made of stainless

steel. Objects made of normal steel covered with electroplated finishing can also bring in rust if their plating has become defective. In many cases, only one instrument will be enough to serve as a source of rust, and can contaminate the other instruments, or cause foreign rust to develop in the autoclave. Foreign rust can easily spread to other instruments or to the inside of the autoclave as airborne rust, where it will cause rust corrosion.

For this reason, it is very important to regularly wipe out the pressure vessel to prevent any foreign rust from depositing and lodging on its surfaces. Foreign rust may be removed with mild scouring agents which do not contain chlorine: for example, the German products ATA, VIM, or metal-cleaner products in paste form (such as are used for the cleaning of chrome). WARNING: Do not use steel wool or steel brushes, or any agent containing chlorine. Before cleaning the pressure vessel, remove the tray rack out of the pressure vessel, toward the front.

IMPORTANT INSTRUCTION: To avoid foreign rust problems before they start, sort out any rust-producing instruments and do not allow them into the autoclave.

9. Maximum number of sterilization cycles possible

MELAG Autoclaves can carry out approx. eight (8) sterilization cycles in one day. This great number of sterilization cycles is possible because of the special features of the MELAG system, which requires only a relatively small amount of distilled water to vaporize and to condense for each sterilization cycle.

IMPORTANT NOTE: When one sterilization cycle has ended, then the user **must wait thirty (30) minutes** after the point in time when the timer has switched the autoclave off, before he starts the next sterilization cycle. If the user does not wait for 30 minutes, then there is a danger that the heat still stored in the thick-walled stainless-steel pressure vessel will cause the temperature controller to switch off the heating system too early during the following cycle. In such a case, the MELAG Autoclave would not reach the selected pressure in the next cycle, or would not maintain it sufficiently long.

10. Instructions in case of operating trouble or malfunctions

The following instructions for operating trouble are provided to help the user clear up minor trouble himself, or to help him more accurately describe malfunctions to his authorized dealer, warehouse agent, or customer-service representative.

10.1 The pressure gauge shows no pressure, or insufficient pressure:

If, after a sterilization cycle, the red non-return (slave) pointer does not indicate at least the pressure which is required for the sterilization program selected, then check for the following:

a. Make sure that the electric plug is inserted properly into the power outlet, and that the outlet provides sufficient power. When the user sets the electric timer, the power signal lamp [4] should light up if the power system is functioning properly.

b. Make sure that the required amount of water has been filled into the pressure vessel.

c. Check to make sure that the switch for the water feed [8] has been closed. If left open, the required pressure will not be achieved.

d. Check to see if the pressure gauge [3] is defective. If the thermometer [5] shows the proper temperature for the program which has been selected, and if the pressure gauge shows no pressure, then the pressure gauge is probably defective. According to the saturated-steam curve, a pressure of 1.0 ... 2.0 bar must be present for a temperature of 120 ... 134°C. Exchange the pressure gauge if it is defective.

10.2 **The pressure gauge shows excessive pressure:**

a. The most common cause of excessive pressure in a MELAG Autoclave is pressure overshooting. This will result when the autoclave is still hot from an immediately previous sterilization cycle, and if a new cycle is started with only a small amount of objects loaded for sterilization. In such cases, the heat still in the unit will cause the maximum pressure to be very quickly reached in the following cycle. During this shortened period of pressure rise, there will not be enough time for physical processes to take place to expel from the pressure vessel all the air which was present at the beginning of the cycle.

The remaining air will cause an additional increase in pressure, which will allow the entire pressure to increase beyond the selected sterilization pressure.

The steam in the pressure vessel is therefore non-superpressurized and saturated. As a result, the readings shown by the pressure gauge [3] and the thermometer [5] will deviate from the values shown on the saturated-steam curve (see Section 10.1.d above).

Since, however, all MELAG Autoclaves are equipped with electronic temperature control, the selected sterilization temperature will in any case not be exceeded. In addition, the continuous expulsion of air from the autoclave during the progress of the sterilization cycle will gradually reduce the pressure overshoot. To make sure that the pressure has in fact sufficiently decreased, check the white pointer of the pressure gauge **five minutes before the end of the 2-bar sterilization cycle.** The pressure should be within the selected pressure range.

b. It can occur that the non-return (slave) pointer of the pressure gauge [3] will jam in the gauge housing. In such a case, the white pointer will attempt to pull along the jammed red pointer. If the pressure is great enough, this will cause the red pointer to shoot higher. The red pointer will then not stand at the maximum pressure actually reached during sterilization, but at the point to where it has been shot by the white pointer. The red pointer will then stand at a pressure which was not actually reached during operations.

If the user suspects that the above jamming and false pressure indication has occurred, he should move the red pointer to a point beyond the normal

selected pressure, before starting the sterilization cycle. The user can then observe the white pointer to see which pressure is actually achieved.

c. If the instruments are not thoroughly cleaned before loading them into the autoclave, the dirt and debris from them can partially or completely obstruct the vent nozzle [B]. The purpose of this nozzle is to allow air to leave the pressure vessel during its heating-up phase. If this nozzle is stopped or obstructed, air will remain in the pressure vessel during the sterilization phase. This will cause unncessary additional buildup of pressure.

   Carefully clean out the vent nozzle by using a small precision instrument with a diameter not larger than 0.5 mm.

10.3 **The pressure shown on the pressure gauge or red non-return pointer is too low:**

a. The user should not load more objects into the MELAG Autoclaves than indicated by the maximum amounts stated in the technical data (see Section 1 above). If the autoclave is overloaded, the increased mass required to be heated will prevent the autoclave from reaching the operating pressure required for the available killing time. Or, the proper pressure will be reached too late.

   THEREFORE: Do not load more objects into the autoclave than stated in the technical data.

b. The user should make sure that there is at least a thirty-minute (30 min.) interval between sterilization cycles. If this instruction is not observed, there will be excessive heat still in the autoclave when the next cycle begins. The heating system will switch off too soon, and the required pressure will not be achieved during the next process. Or, this pressure will not be maintained throughout the entire sterilization cycle.

All MELAG Autoclaves operate on the basis of a fixed quantity of water per sterilization cycle. If there is not enough water in the pressure vessel, this will prevent the autoclave from reaching a sufficient pressure level, or will cause the achieved pressure to drop too soon -- which will, in turn, bring about the danger of overheating in the pressure vessel. For this reason, the user must by all means observe the instructions in Section 3 above for setting up MELAG Autoclaves.

c. If the instruments are not thoroughly cleaned before loading them into the autoclave, the debris which they carry can cause leakage in the solenoid valves for water feed and for quick pressure release.

If the user detects steam or drops of water on the cooling coil of the quick pressure-release system [G] while the pressure is building up in the autoclave, this is a sign that there is a leak in the solenoid valve for the quick pressure-release system. It is often possible to remove the debris which causes the leak from the seal of the solenoid valve, as follows: After the autoclave has reached

the maximum pressure which is possible with the valve leak, press the control button for quick pressure release [2]. The steam now leaving through the opening solenoid valve will often remove the debris which causes the leak.

IMPORTANT NOTE: After the pressure has returned to "0" here, by all means be sure to turn the timer to the left, back to the "0" position. If this is not done, the lack of water or steam in the pressure vessel will cause the autoclave to overheat.

If, however, a great amount of steam and water leaves the autoclave during these attempts, then the solenoid valve is defective.

If, during the phase when the pressure is building up in the autoclave, bubbles of air emerge from the dirt filter upstream of the water feed [F], then this is a sign that the solenoid valve for the water feed is leaking. It will often be possible to clean out the debris causing the leak in the solenoid valve by trying the following: After the autoclave has reached the maximum pressure which is possible with the valve leak, activate the control switch for the water feed [8]. The steam then flowing through the solenoid valve will often clean out the debris causing the leak. The operation of this switch [8] will cause the pressure in the autoclave to drop.

IMPORTANT NOTE: After the pressure has returned to "0" here, by all means be sure to turn the timer to the left, back to the "0" position. If this is not done, the lack of water or steam in the pressure vessel will cause the autoclave to overheat.

d. Check to determine whether the safety valve [D] may have a leak. For access to this valve, first open the lid held by a retainer spring. The pot in which this safety valve is installed must remain dry throughout the entire operation of the autoclave. If there is moisture in this pot, the safety valve has a leak and must be replaced.

e. If the instruments to be sterilized are not carefully cleaned before operations, then the distilled water and the steam will be contaminated with debris. If this is the case, and if the autoclave is being frequently used, the resulting continuous erosive flow action will enlarge the opening of the vent nozzle. This will cause excessive loss of steam. The vent nozzle must be replaced.

f. If the user tries to turn the setting handle of the electric timer [7] past its normal mechanical limits, this can cause the timer setting handle to slip on its axis. In such a case, the angle of rotation reached when the timer is set will no longer coincide with the angle of rotation indicated on the timer scale. The actual operating time of the autoclave will then not coincide with the desired setting. When the autoclave has switched off, the white marking on the setting handle of the timer should point to the "0" on the scale.

   If this is not the case, and if the setting handle of the timer needs adjustment, take off the cover of this handle and loosen (do <u>not</u> unscrew) the nut of

the collet chuck lying under the cover. Then the setting handle can be adjusted.

10.4 Overheating in the autoclave

Overheating in MELAG Autoclaves is almost always the result of not enough water in the pressure vessel. Check for the following:

a. Check to make sure that the autoclave was set up, shifted, or moved to another location, in accordance with the instructions given above in Section 3. If the autoclave has been improperly set up, shifted to another position, or incorrectly moved, the amount of water filled will not coincide with actual water requirements.

b. Check to see if the vent nozzle [B] has become excessively eroded (enlarged diameter). See Section 10.3.e above.

c. Check to make sure that the switch for water feed [8] has been closed after use.

d. Check to see whether the setting handle of the timer [7] has slipped on its axis. See Section 10.3.f above.

e. Check to make sure that the amount of textiles loaded into the autoclave does not exceed the limits

given above in the technical data (Section 1). Since the sterilization of textiles absorbs a great deal of water, **never overload with textiles.**

f. Check to see if the solenoid valves are leaking or defective for the water feed, or for the quick pressure release. See Section 10.3.c above.

g. Check to see if the safety valve [D] has a leak. See Section 10.3.d above.

10.5 <u>There is excessive water remaining in the pressure vessel</u>

There will always be a small amount of water remaining in the pressure vessel after sterilization. When the autoclave cools down, the residual steam in the chamber, no longer under pressure, will condense on the surfaces which cool first -- the door and the bottom of the vessel -- and will collect in the rear of the vessel as water.

If an excessive amount of water is left in the vessel after sterilization, however, check for the following:

a. After a sterilization cycle has ended, there will always be a certain amount of water in all MELAG Autoclaves. This water serves as protection from the radiant heat of the stainless-steel jacket of the vessel.

After the timer switch has run out [7] and after the power signal lamp [4] has switched off, immediately press the quick pressure-release button [2]. This will cause the outflowing steam to eject any water remaining in the pressure vessel downward, through the bottom of the vessel.

If the pressure-vessel filter is clogged, however, this procedure will not be possible, or cannot properly take place. The drain of the pressure vessel, at the bottom rear of the autoclave, has been provided with a filter to prevent debris from obstructing the piping system and the solenoid valves.

If this filter is clogged, excessive residual water will remain in the pressure vessel. The filter can be unscrewed with a SW 14 wrench, and can be cleaned or replaced.

b. If instruments are not thoroughly cleaned before sterilization, the debris which they provide can also cause very slight leaks in the solenoid valve for the water feed. These leaks may be so slight that the autoclave still reaches its proper pressure (see Section 10.3.c above), but that water will drip from the distilled water tank into the pressure vessel after the sterilization cycle has ended. In such a case, the water in the vessel is not actually the normal, expected residual water.

In case of excessive water in the vessel, wipe the vessel dry after the tray rack has been removed. If the autoclave is functioning properly, the vessel should still be dry after several hours. If addi-

tional water has run into the vessel, however, clean the solenoid valve for water feed by blowing it out in accordance with instructions in Section 10.3.c above.

10.6 Available spare parts

Part no.:	Part description:
▪ 1566	Vent nozzel (with M6 / SW 8 threading)
▪ 1541	Safety valve (officially calibrated)
▪ 1700	Door seal for Autoclave Type 17
▪ 2300	Door seal for Autoclave Type 23
▪ 2953	Filter for the pressure vessel
▪ 1576	Timer switch
▪ 1520	Pressure gauge
▪ 2926	Thermometer

The solenoid valves for the water feed and for the quick pressure resease are identical.

▪ 1557	Solenoid valve (blue coil)
▪ 2956	Coil for solenoid valve (blue)
▪ 2946	Coil for solenoid valve (black: an older model)
▪ 1569	Overheating protection unit (mounted on the pressure vessel)
▪ 1504	Door locking latch **(IMPORTANT: When replacing parts here, be sure always to replace the door latch and the star grip together.)**
▪ 1501	Star grip for door