GEWO FEINMECHANIK

Operating instructions

Pipette Washing Machine

MPS

Stand: 01.07.2023

I. Introduction

Since many years company Gewo Feinmechanik GmbH (Department: H. Hoelzel) is well known in the laboratory for its equipment to research and industry. It is our task to develop and manufacture instruments which will assist the laboratory personnel in routine laboratory operations. This it to free the highly qualified staff to assume more responsible jobs.

According to customer requests we developed the Automatic Pipette Washer model MPS to operate from a single water supply either with distilled, demineralised or de-ionised water along with easy handling. The design of the MPS is intended for laboratories having a lower workload or the need for a faster throughput of contaminated pipettes.

As you yourself have become a user of a Automatic Pipette Cleaning Device, you will realise the quality and its performance. Though, we are always open to technical and operational suggestions. On this basis we also welcome your comments and critics.

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1 Description of equipment

1.1 Operation of the Pipette Washer/ Dryer Model MPS

The MPS in equipped with two independent cleaning programs.

The MPS may be connected to either a de-mineralised-, distilled-, or de-ionised water supply. Consequently only one water supply is needed.

Working with tap water requires a different operating procedure.
Tap water will contaminate the pipettes when heated because it contains magnesium- and calcium carbonate which will leave a lime deposit on the pipettes.

The cleaning detergent is dispensed automatically via a integrated peristaltic pump for a 5 Litre detergent reservoir located at the back of the MPS.

The pipettes are washed in a special alkaline cleaning solution which is heated to 95°C in program 1 and to 70°C in program 2.

The total operation time for washing, rinsing, and drying is fixed to 2h 54 min. in program 2 and to 3 h 54 min. program 1.

The maximum bath temperature and the time for the bath may be modified in the factory at any time to accommodate customer requirements.

The cleaning process of the pipettes in the special alkaline cleaning solution is followed by rinsing of the pipettes.

Several rinse cycles are necessary to obtain perfect cleanliness of the pipettes.
During these cycles the contamination is taken off the pipettes. But also the cleaning agent will removed reliably and transported from the rinse basin into the drainage.

In program 1 the pipettes are rinsed by way of three water cycles.
In program 2 the pipettes are being rinsed by means of two water cycles.
In each program the last rinse takes place at 90°C to ensure absolute cleanliness from sample contamination and the alkaline bath.

Several minutes of residence are fixed between each water replacement to allow the rinse water to affect the soluble contaminant.

After each rinse cycle the water is pumped completely from the water basin. Thereafter the basin is getting refilled. By emptying it completely the spread of dissolved contaminant and cleaning agent is practically eliminated.

The different rinsing cycles are monitored by a water level control by which the unit operates independently from water pressure avoiding flooding of the wash- rinse-dry basin.

The filling level of the basin can be pre-set with the key "water level" according to the length/ height of the pipettes being either to 450 mm or 650 mm.

After the last rinse cycle the water will be pumped out completely from the basin. The pipettes remain in their position for drying. They are being dried for 40 minutes at the pre-selected drying temperature of approx. 130°C.

During the drying time the water, running off the pipettes, the basket, and the basin itself, is permanently removed by a moisture pump and lead into the sewage system.

Vapour which is caused by the heater within the drying process will become moisture by means of condensation which again will be removed by the moisture pump.

The advantages of the MPS are ultimate cleaning of the pipettes even of a smaller quantity. Because of a relatively short cleaning time clean pipettes are readily available. Therefore pipette cleaning with the MPS is highly economical.

2 Your contribution toward environmental conservation

2.1 Economical cleaning/ rinsing/ drying

The pauses (dwell times) are integrated into the rinse cycles. These pauses reduce the need for additional rinse cycles. Thus permanent rinsing of the pipettes can be avoided. By this principle the cleaning quality is considerably improved, because during the rinsing pauses the water can have a much better effect on the already detached contamination particles. This technique also makes the Pipette Washer a water and energy conserving product.
In addition you can contribute to the economy of your equipment if you take the following suggestions into consideration.

- Connecting the Pipette Washer to a hot water system leads only to a minimal saving of energy, because heating (boiling) time of the cleaning leach is pre-set. In case you still prefer a hot water supply, you should discuss this intention with us first. If the temperature of the water entering unit is higher than 60°C the built in solenoid valves can become overheated. As a result of it there can be considerable malfunction of the valves.

- Control the capacity of the pipettes without overloading it. See step 5.2 Insertion of pipettes. This way you will rinse most economically and therefore contribute to a conservation of vital resources.

- If possible try to avoid cleaning pipettes of different lengths in the same wash cycle. This way you can choose the appropriate water level and save water.

- The amount of the detergent should be chosen according to the degree of contamination of the pipettes. In general a quantity of 20 ml is sufficient. Too much or unsuitable detergent can lead to an overflow of the cleaning leach during heating. By proper and correct use of the detergent the sewage will not be loaded unnecessarily and the environment will be protected.

2.2 Disposing of transport and packing materials

The intention of a costly packing of technical products is to protect the equipment from transport damages. Because of a distinctive environmental feeling at company GEWO Feinmechanik GmbH great importance is attached to choosing packaging materials according to environmental amicability and waste management criteria i.e. they can be recycled.

- The cardboard box consists mainly of waste paper.
- The styro foam parts are foamed without the use of FCKW.
- The transparent foil is made of polyethylene (PE) and therefore is neutral to ground water.

The recycling of the packaging material into the material value cycle saves raw materials and reduces the waste quantity.

NOTE

For transportation of an already used unit the detergent reservoir and the water basin must be completely empty and if possible dry.

3 Safety notices and warnings

The MPS conforms in general to the prescribed safety rules of DIN EN 292-2. (German Industry Standard). Improper use of the unit can lead to damage to people and objects.

Therefore before the first use of the unit please read the instructions carefully. By doing this you will protect yourself and avoid damage to the unit.

NOTE

When in doubt please read the operating instructions first or call your agent or the manufacturer.

3.1 Use the MPS only in accordance with its design purpose

- This unit shall be used only to clean pipettes. Every other use is prohibited and can lead to damage to persons and objects. For damage which originates by improper use, the manufacturer cannot be made liable.

CAUTION

The unit is not allowed to be applied to clean pipettes which, without any further treatment, will carry liquids which will subsequently enter the human body.

3.2 Avoiding injuries to yourself

- The unit is only electrically safe if it is connected to a ground system installed according to regulations. This fundamental safety rule must be applied for a safe operation of the pipette washer. If in doubt, the electrical installation is to be checked by an authorised electrician.

  The manufacturer cannot be held liable for damages which are due or were due to a faulty or interrupted ground lead. A missing ground lead may result in a deadly electrical shock.

WARNING

Never use the Pipette Washer without a ground lead!
The operators life could result !

- The MPS is built for connection to a power socket with ground connection which is fused with a 10 Ampere slow blow fuse. (230 V)

  For safety reasons it is illegal to use extension cords. There is danger of overheating the cable because it may be specified for a lower current or the plug connection itself may cause resistance between the contacts which will act as a heater.

  Because of the relatively high power consumption of the heating elements of the pipette washer, the unit should be connected to a separate power line to which no other electrical devices are applied.

  Repairs should not be performed without first having consulted the manufacturer or the authorised agent.

  Repairs should only performed by authorised technicians, Improper repairs may damage the unit or harm people. The manufacturer connot be made liable for such damages.

CAUTION

For maintenance and repairs of any kind the MPS must be electrically disconnect from the power line.

- A damaged unit can endanger your safety. Therefore the unit has to be shut down and the manufacturer is to be informed.
- We recommend to use only selected Gewo (H. Hoelzel) detergent .
  Do not mix detergents or other cleaning chemicals.
  Use only distilled, de-mineralised, or de-ionised water.
- During or immediately after completion of the washing cycle or after the last rinse cycle do not put your hands into the wash basin and/or touch the metal cover/lit on the top of the basin to avoid getting burned. Before taking out the cleaned pipettes after washing, rinsing, or drying you should wait approximately one hour to have the pipettes and the basket cooled sufficiently or to wear heat resistant gloves instead.
- The safety and danger notices for the use of the detergent/ cleaning agent are strictly to be observed. Also read the safety notices on the label of the detergent package.
- The water in the basin is not drinkable even before a dosage of detergent had been added!
- Pay attention to a safe floor placement of the Pipette Washer. The Pipette Washer should be installed on a flat and stable floor with sufficient access for unexpected service.
- The detergents must be kept separate from food, beverages and animal feed. It shall not come into contact will eyes or skin. The detergents, if improperly used can lead to etchings and irritation of the respiratory tracts. Use suitable protective cloths, gloves and goggles or a visor to protect yourself.
- If detergent has come into the eyes immediately rinse eyes thoroughly with water and consult a physician. If an accident has occurred or a sudden discomfort in felt see a physician and show the safety card of the substance.

CAUTION

Cleaning detergent or neutralising agents or other cleaning chemicals shall never come into the reach of children

3.3 Avoiding of damage to property

- Make sure that voltage, frequency, and fusing of the power line to which you want to connect the Pipette Washer correspond with the details on the identification plate attached to the unit or the step up transformer.

- Detergents proposed by the manufacturer normally lead to perfect cleaning and rinsing results. Therefore it is advisable to obtain the detergent from the manufacturer or a recommended supplier. In using household or commercial detergents the result of the cleaning and rinsing can be severely influenced. After some time different detergents may remove the paint from the graduations of the pipettes or leave a thin alkaline film on the glass surface.

The manufacturer cannot be held liable for damages to objects or persons which occur by the use of detergents not proposed by the manufacturer (foaming/spilling of the cleaning leach).

- Glass splinters and broken pieces of pipettes have to be removed immediately and carefully after the end of the rinsing cycle and the cooling down. Glass splinters, also in small quantities, can lead to a reduced water drainage and therefore can lead to damage of the unit.

  Already in very small pieces of glass splinters can influence the function of the drainage pump integrated in the MPS severely.
  If, after completion of the drying process, condensed vapour is visible on the pipettes and on the walls of the basin, it may be a indication of insufficient drainage caused by a damaged pump because of glass pieces in the pump system.

Water damage can be reliably avoided when the following requirements are observed.

- Closing of the faucet during longer breaks such as annual holidays
- Glass splinters of broken pipettes may lead to a blockade of the drain and as a result will influence the water drainage.
  Furthermore, the glass splinters from broken pipettes can reduce the cleaning and / or rinsing effect by limiting the function of the drainage pump.
- The water connection at the unit and the supply line shall be inspected in regular intervals for perfect tightness.
- The cleaning basin should not remain filled with water for a longer period of time. This may cause the diaphragm of the level regulator to be kept under load. This in turn may lead to a deformation of the diaphragm. Such a fault can be recognised by an overflow. Which means the water flow will not stop when the set level is reached. To resolve this effect, the unit shall be filled at least twice with water and be emptied twice until the diaphragm of the water level regulator has retracted to its original position.

The manufacturer cannot be held liable for damages to persons or objects which are caused by disregard of the safety notices and warnings.

4 Putting the pipette washer into operation

4.1 General information for installation

Place the MPS into the desired position and determine the lengths and the elbows of the drain hose. Use the enclosed couplings and ring clamps. According to the attached drawing (see *7 Appendix*) the Pipette Washer is to be placed in the vicinity of a water drain or a basin. The drain hose should be placed directly into a drain tube or led into a larger basin or a sink.
If the drain hose has to be installed in a 90° direction from the present position it must be done with the attached couplings and elbows to avoid buckling of the hose. It may be necessary to shorten the drain hose to a favourable length.

Now place the prepared drain hose without buckling into the desired position. The maximum height of the drain hose should be not more than 400 mm above the bottom of the unit . Otherwise the built-in water overflow control will be affected in its function.
Place the MPS into the planned position and slide the black rubber hose over the metal tube (drain tube) on the rear of the Pipette Washer. Secure the drainage hose with the big ring fastener.

Then connect the water supply hose to your water supply system. Test the water supply connection by a short opening of the faucet.

NOTE

The electric power outlet must be fused with a 10 Amps slow blow fuse if the MPS is connected to a 230 V line voltage. 16 Amps at 110 V.

After a power-loss the Pipette Washer will continue with the last activated program, for instance with rinsing or drying. The total operating time of the full program will be lengthened accordingly

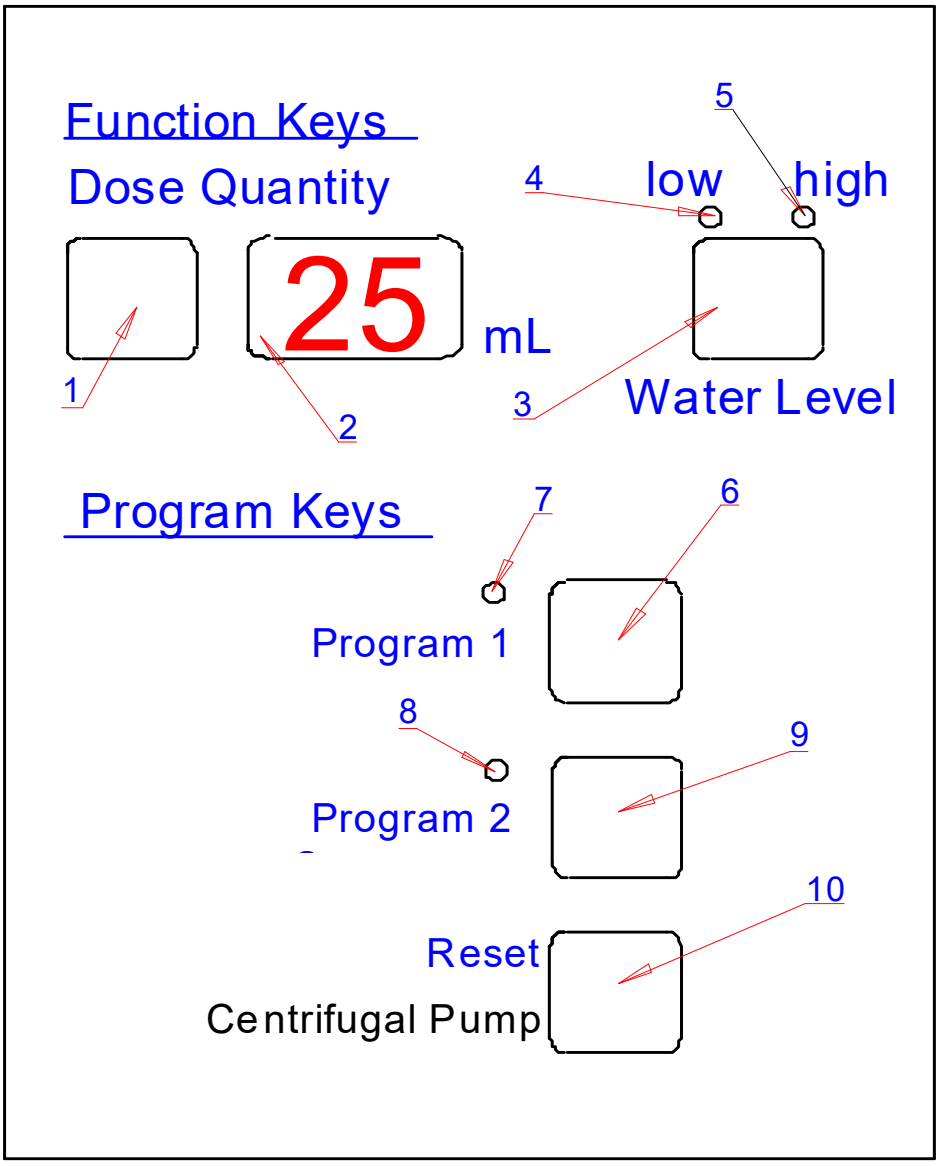
4.2 Keyboard

In the following figure the keyboard of the Pipette Washer is shown.

Figure 4.1: Keyboard layout

4.2.1 Short description of the keyboard

1) Key for dosage of cleaning detergent.



2) Display to define the quantity of detergent.
Operation key 1 the dosage can be increased in 5 ml steps up to a maximum quantity of 40 ml. Operating the key once again the algorithm starts again at a dosage of 0 ml. While the program is in operation a change of the dosage will not be accepted.

3) Key for regulation of water level. (height 450 mm or 650 mm).
By depressing of key 3 the water level is changed between low and high. The activated water level is indicated by the respective LED.

4) LED indicates low water level of 450 mm.

5) LED indicates high water level of 630 mm.

After the end of the program the selected volumes for the dosage of the detergent and the water level remain stored. Starting a new program the volume for the two has to be altered or once again to be confirmed.

6) Key for starting program No. 1 (Running time 3 h 54 min.).

7) LED indicates activated program No. 1.

8) Key for starting program No. 2 (running time 2 h 54 min.).

9) LED indicates activated program No. 2.

10) Resetting the program key causes the program to stoop. The LED of the respective program stops. After depressing the reset key the water basin, if filled with water, will be emptied by the internal pump. All other settings such as water level and rinsing remain activated, but can be altered before a new start of the program.

During operation of the Pipette Washer the keys for dosage (1), water level (3), program No. 1 (6), and program No. 2 (9) is ignored by the control. Only by depressing the RESET key can the program already in operation be stopped.

4.3 Starting procedure

a) Open water taps and check connections for tightness. Turn on main switch.

- The green lamp of the mains switch will light up

b) Adjust program parameters, water level and dosage quantity on the keyboard (see *4.2.1 Short description of keyboard*) according to contamination and length of pipettes to be cleaned.

- Dosage (0 - 40 ml)
- Water level (low / high)

→ operating with low water level. The level should be approx. 460 mm above the bottom of the basin.

→ operating with high water level. Make sure that the water level after filling is approx. 80 -150 mm below the upper rim of the basin.

c) Selecting of programs by operating keys 1 or 2.

- The selected program is started. The water basin is getting filled with water. After approx. 5 sec. the water supply will stop and the detergent will be dispensed. After the dosing is completed the water supply is activated again and the program carries on.

5 Operating the Pipette Washer/ Dryer

5.1 Starting position

After successful starting (see chapter 4), the cleaning of the pipettes can begin.

Before every cleaning operation check the following points.

- Main switch off
- Reservoir sufficiently filled with cleaning detergent
- Water taps open

5.2 Placing the standard pipettes into the basket

Lay the basket with the cylinder on a flat surface.
Slide the pipettes with the mouthpiece into the basket to a full stop. The pipettes are now touching the mesh at the bottom of the basket. When loading there is no preference for length of pipettes or volume. When all pipettes are places in the basket turn the basket in a upright position. Check again that all pipettes are pointing up.
Open the cover of the Pipette Washer. Lift the basket (max. 4 kg) by hold the handle and lower it into the basin of the pipette washer.

Do not overload the basket. Allow about 20 – 30% space respective to the maximum possibility. It is advantage to allow the hot cleaning bath to circulate by thermal convection.

A heat built up in the basin should be avoided. This is necessary to ensure the cleaning and drying of the pipettes and the pipettes do not become damaged (cracks at the mouthpieces.)

5.2.1 Insertion of Pasteur pipettes into the basket

To prevent the Pasteur pipettes from floating they have to be cleaned in a special basket with a specially perforated base and cover. The quiver for Pasteur pipettes can be ordered as an accessories.

5.3 Selecting the amount of cleaning detergent

If the Pipette Washer is used with a de-mineralised, de-ionised or distilled water a liquid cleaning detergent is used. It is dispensed automatically by the Pipette Washer from the 5000 ml reservoir (see 4.3 Starting procedure)

Operating key No. 1 determines the amount of cleaning detergent in a step by step increase of 5 ml to a maximum amount of 40 ml. With an average amount of 10 litres liquid in the cleaning basin a concentration of approx. 0,3 % is obtained when 30 ml are being added. This concentration is completely satisfactory for the cleaning process.

Check in regular intervals the remaining quantity of the cleaning detergent in the reservoir !

Depending on the degree of contamination of the pipettes the amount of detergent should be between 10 ml up to a maximum of 40 ml per water bath (basin). Too much or wrong detergent con lead to a boil-over of the cleaning leach.
When handling the cleaning detergent always observe the safety notices.
(Please refer to 3.2 Avoiding of injuries).

The cleaning effect of the Pipette Washer is so effective that, by using a excessive concentration of detergent leach a poor graduation colour on the pipettes may get removed. Therefore it is advisable to use, if all possible, no to apply pipettes with blue colour painted graduation but rather the longer lasting brown having fused-in graduation. It can be said that the durability of – the fused - in brown graduations is as long as the life time of the pipette.

Manufacturers of pipettes with brown graduations are listed in the appendix.

5.4 Selecting the water level

Before starting the cleaning process you should determine the water level which is either 45 or 65 cm from the bottom of the basin.
(Please refer to 4.2.1 Short description of keyboard.)

By pressing one of the two program keys the cleaning sequence will start.

In case that the tap water pressure has dropped below 0,5 bar during operation, the water supply will automatically be interrupted. If the water line pressure returns back to normal the program starts again at the same point were it became interrupted. This will ensure that the cleaning time is always of the same quality regardless of varying water pressure.

5.5 Selecting the desired program

The cleaning and drying temperatures are pre-set by the manufacturer to the following values.

Leach temperature approx. 95° C with program 1 and approx. 70° C with program 2

The most thorough cleaning effect is achieved by a near boiling temperature of approx. 95°C.

Drying temperature approx. 130°C

The drying temperature is pre-set to this value to guarantee drying of pipettes including those with a very thin inner diameter.

In case that condensed water vapour is present on the after the cleaning process including at the basin walls or the pipettes it must be assumed that the drying time was not sufficient and should therefore be increased.

To receive perfectly dried pipettes a space for air circulation between the pipettes must be kept.
(Please consult 5.2 Insertion of pipettes).

In case you need different temperature values these can be adjusted individually by the manufacturer. The temperatures indicated above represent values which are proven since years but may not apply to your specific task.

5.6 Washing, rinsing and drying program

The sequence of the rinsing time in programs No. 1 and No. 2 is fixed in the electronic control and may only be changed in the factory.

The heating time (leach cleaning) with program No. 1 is approx. 90 min., with program No. 2 it is only approx. 50 min.

The rinsing (filling the basin and draining it) of the pipettes is carried in 3 purge cycles in program 1 and 2 purge in program 2.
The last purge is performed automatically with approx. 90° C heated water.
Between the individual rinsing cycles, in the so called rinsing pauses, the water can more effectively affect the loosened contaminant particles from the pipettes and also reliably remove any remaining particles and remains of the cleaning detergent from the pipettes and from the rinsing container. The longer the pipettes remain in the rinsing water the greater will be the cleaning effect. This will result in a reduction in the number of rinses and a saving or rinsing water.

The pipettes are always cleaned with 3 respectively 2 rinsing cycles programs. The length of each cycle adds to the cleanliness of the pipettes.

After draining the last water from the cleaning-rinsing, the resistance heater which had been the water heater before is started to dry the pipettes. The drying cycle is approx. 40 minutes in each of the two program.

5.7 Loading the cleaning detergent into the reservoir.

If there is only a small amount of cleaning detergent left in the supply reservoir it is advisable to refill the reservoir to maintain the supply and the function of the dosage pup. To do so open one of the yellow container covers at the rear of the Pipette Washer. Use the "filling aid" (funnel) supplied with the MPS. Carefully fill the reservoir with the appropriate liquid cleaning detergent Observe the safety notes.
(Please consult in 3.2 Avoiding of injuries.)

Spilled detergent should be removed from the Pipette Washer or the lab furniture, from the detergent reservoir tank and other devices in vicinity immediately.

NOTE

Please observe that under no circumstances should neutralising agent be filled into a supply reservoir which is marked with cleaning agent and vice versa. A chemical combination of neutralising- and cleaning agents can heavily disturb the function of the pipette washer or lead to health problems.

The manufacturer cannot be held liable for damages to persons or objects which are due to disregarding the above mentioned comment.

5.8 Washing heavily contaminated pipettes

Pipettes contaminated with silicon cannot be cleaned sufficiently with common cleaning detergent. In every case these pipettes have to be treated separately. Pipettes contaminated with silicone can severely reduce the quality of the complete cleaning process.

In case one or more pipettes had been contaminated with silicon inadvertently and had already been cleaned in the Pipette Washer the quality of the cleaning will no longer be sufficient.
In this case please proceed as follows:

1. Increase the quantity of the cleaning detergent approx. by fivefold and clean the pipettes in this way 2 to 3 times. Pipettes with brown graduation get through this procedure without problems.

2. In case the procedure described above is not been successful the pipettes shall be freed from the silicone cover as follows:

   a) Cleaning with solvents, for example

      → Chloride hydrocarbons

      → Toluene or benzene

Let the solvent react for several hours, then rinse pipettes several times with fresh solvent again.

b) Wash with cleaning detergent having a strong alkaline base. Repeat the cleaning procedure several times using plenty of cleaning agent.

c) Cleaning in a potash bath (10% potash leach + ethanol or methanol)

Leave the pipettes in the bath for several hours then rinse with fresh solution, place pipettes in the bath again and so on.

5.8.1 Pipettes with highly concentrated protein residues, for instance dairy products

Be sure to soak the pipettes in a mild solution of the detergent immediately, to prevent the protein residues from drying to the surface.

5.8.2 Pipettes for use in cell cultures

It is strongly recommended to use Hoelzel cleaning detergents with the Pipette Washer only. Additionally cleaning program No. 1 should be selected, to get an optimised effect of the water during the dwell times.
Not the frequent change of the water or the extreme amount of detergent but the length of time the glass surface in the rinse water will be decisive for the quality of the pipette cleaning. Thus, spreading of traces of detergent can be avoided.

5.8.3 Pipettes with oil or grease containing residues

(lubricant or food stuffs)

Pipettes containing with mineral oil or lubricant residues should be soaked in every case in a strong detergent solution or in extreme cases in benzene or similar cleaning agents, before the main cleaning process is to take place in the Pipette Washer. The soaking of pipettes with grease residues in a detergent solution is normally satisfactory.

6. Technical description

6.1 General notes

The connection of the Pipette Washer to the water supply is done with the water hose supplied with the unit. The water supply of the unit is protected by a solenoid valve. A water pressure of 0,5 to 6 bar is required.
The drainage of the residue water is done by a pump integrated in the Pipette Washer. The operation of the drainage process can be audibly noticed when putting your ear close to the MPS. It is the sound of the electric motor of the pump and by the water running through the drain hose.

During the complete rinse program, the water taps have to be kept open

All units are equipped with a temperature to protects the temperature from rising above 150° C.

6.2 Signal indicators

The lighted LED of the keyboard shows the respective program parameters. For instance the dosage of the detergent and the water level.

In informs the operators at every step of the process about the status of the washing, rinsing, and drying program

6.3 Setting the water level in the basin

The maximum water level in the basin is set by the manufacturer to a distance of approx. 140 mm from the rim of the cleaning basin. Should the water level raise critically because of ageing of the pressure diaphragm, for example the minimum distance to the container rim is fallen below 50 mm, a readjustment of the pressure diaphragm will be necessary.

NOTE

The readjustment should only be done after connecting by telephone with one of the service technicians of the agent or the manufacturer.

The manufacturer cannot be held liable for damages to persons or objects which develop from disregarding the above notice.

6.4 Supplementary pump for de-mineralised, de-ionised or distilled water.

In case the actual water pressure is lower than 0,5 bar. GEWO Feinmecchanik GmbH can offer a supplementary pump which will develop the needed pressure for the Pipette Washer to work properly. This may be the case when the de-mineralised, de-ionise or distilled water supply comes from storage containers and not from a central pipe systems with subsequent pumps.

6.5 Fault diagnosis

To check the installation after the first set up of the Pipette Washer it should be proceeded exactly according to the notes given in chapter 4 Putting the pipette washer into operation. Possible faults or functional troubles arising later, can quickly be localised and resolved.
In such a case it be advantages to supply hints for a successful remedy of faults or to propose or start an eventual necessary repair.

7 Appendix

7.1 Brief operating instructions for model MPS

It is advisable to keep the sequence of the following steps to maintain an undisturbed operation.

1. Open water connections and do not close them during the whole cleaning process.

2. Turn on main switch.

3. Insert quiver (basket) with pipettes (pipette tips are pointed up) into the cleaning basin. Pasteur pipettes have to be handled in the special containers with perforated cover. The basket should not be filled excessively to avoid a reduction of the cleaning-, rinsing-, and drying process. Pipettes with silicone contamination have to be removed in order to be pre-cleaned seperately.

4. Select for a low or high water level with key "Wasserstand" (water level)

5. Select the quantity of cleaning detergent with key "Dosiermenge" (dosing quantity).

6. Select cleaning program No. 1 or No. 2.

7. Close the cover/ lit of the wash-rinse-dry basin.

7.2 Technical data

Operating voltage	220/230	Volts AC
Other Voltages are optional	110 V, 60 cycles	Volts AC
Current	6 (at 230 Volt)	Ampere
Current	13,2 (at 110 Volt)	Ampere
Power consumption	1,2	kW
Energy consumption	approx. 4	kWh
Fuse	10	A (slow blow)
Fuse at 110 V	16	A (slow blow)
Max. incoming water temperature	60	°C

Water level max.	610/ 480	mm
Water pressure min-max	0,5 - 6	bar
Water quantity in the basin	11/ 8*	litre
Water consumption	(max.)	55/ 40 * litre

(applicable to de-mineralilsed-, de-ionised- or distilled water)

Detergent consumption (20 ml are typical)	0 - 40	ml

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* applicable at low water level.
All figures refer to a max. filled wash basin without pipettes. In practise there will be a 20% water displacement by the basket and the pipettes.

	program 1	program 2
Temperature of cleaning bath	95° C	70° C
Heating an dwell time of cleaning bath	95 min.	55 min.
Number of rinses	3	2
Total time of rinses	99min.	79 min.
Last rinse temperature	90° C	90° C
Temperature for drying	130° C	130 °C
Time for drying	40 min.	40 min.
Total time of program	3 h 54 min.	2 h 54 min.
Number of baskets 60 mm		max. 4 x pieces Ø
Height of baskets	330/ 460 mm	
Number of basket	1 x piece	Ø 135 mm
Height of basket cylinder	300/ 415 mm	
Number of baskets – half circle		2 pieces Ø135 mm

MPS dimensions:

Depth	370	mm
With reservoir	480	mm
Width	250	mm
Height	920	mm
Weight	40	kg

Material 1.4301

The values given in brackets refer to operation with low water level. The given values for water quantity and water consumption are maximum values without pipettes in the washer. The water consumption is reduced according to the water displacement of the pipettes. The power consumption given, corresponds with the power consumption at full heating time and maximum drying power.

7.2.1 Loading capacity of pipette washer MPS

The values given are empirical and refer to a basket with a diameter of Ø135 mm.

graduated measuring pipettes

volume [ml]	0,1	1,0	2,0	5,0	10,0	25,0	50,0	
approx. diameter		6,0	6,4	6,8	8,0	11,0	13,0	18,0
piece / quiver	200	180	160	145	75	55	25	

full pipettes

volume [ml]	2,0	3,0	5,0	10,0	20,0	25,0	100
approx. dia.	7,5	9,0	12,0	14,0	19,0	21,0	28,0
piece / quiver	150	115	70	45	25	20	10

The values given for the loading capacity of the MPS are empirical and can deviate slightly from the real values obtainable.

7.2.2 Waterflow schematic of the Pipette Washer model MPS

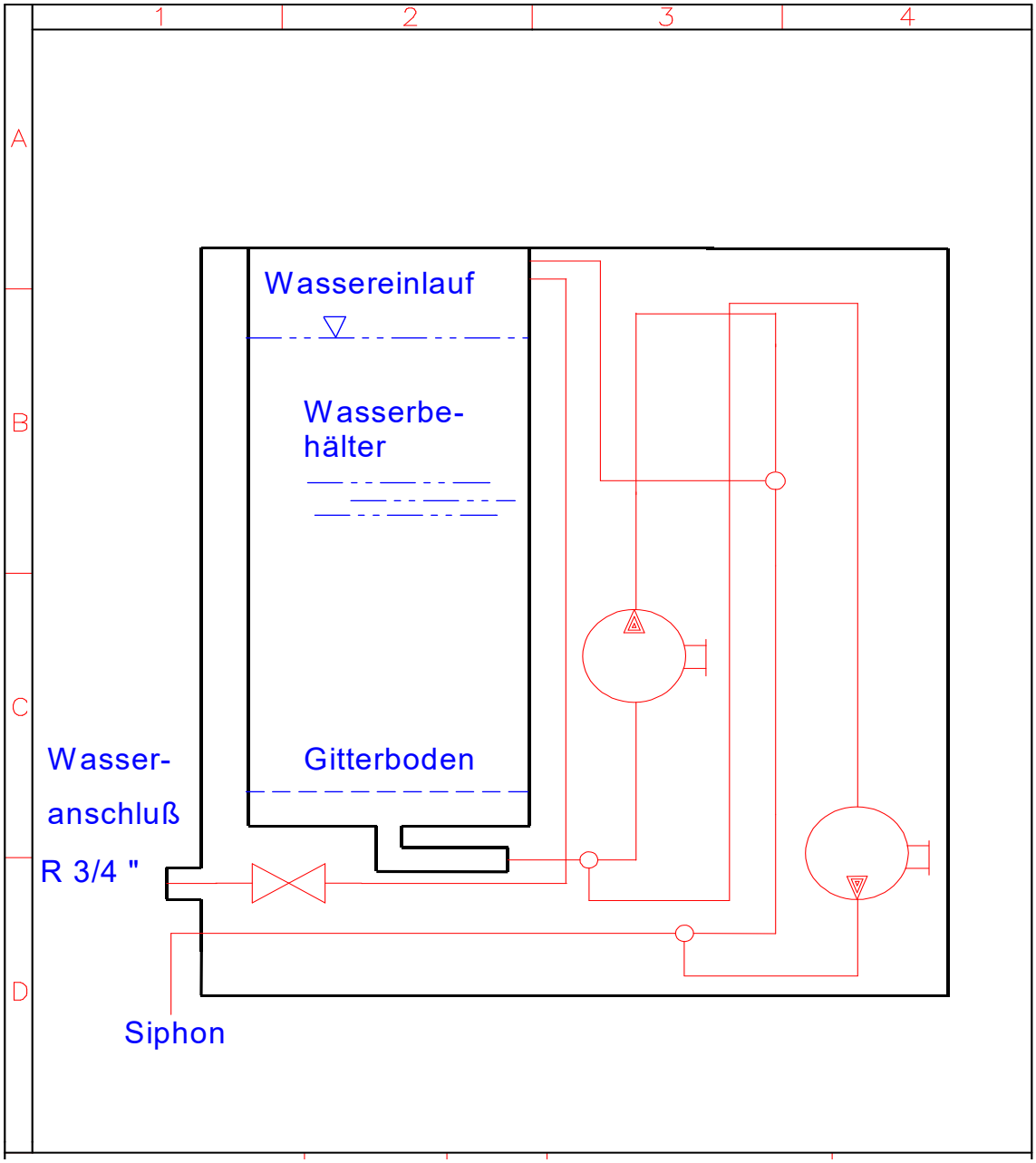

Figure 7.1: Wateflow scheme

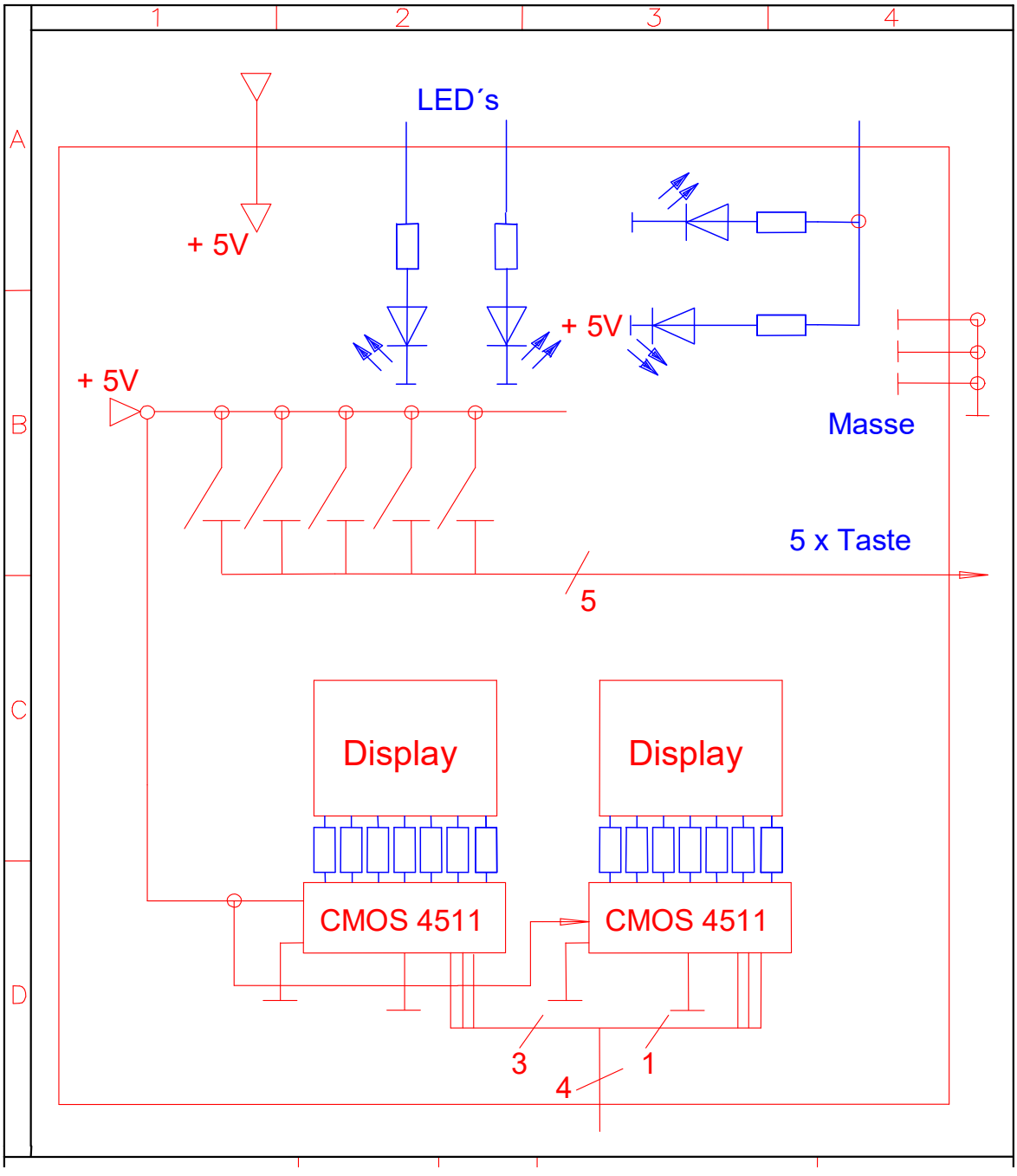

Figure 7.2 Front panel

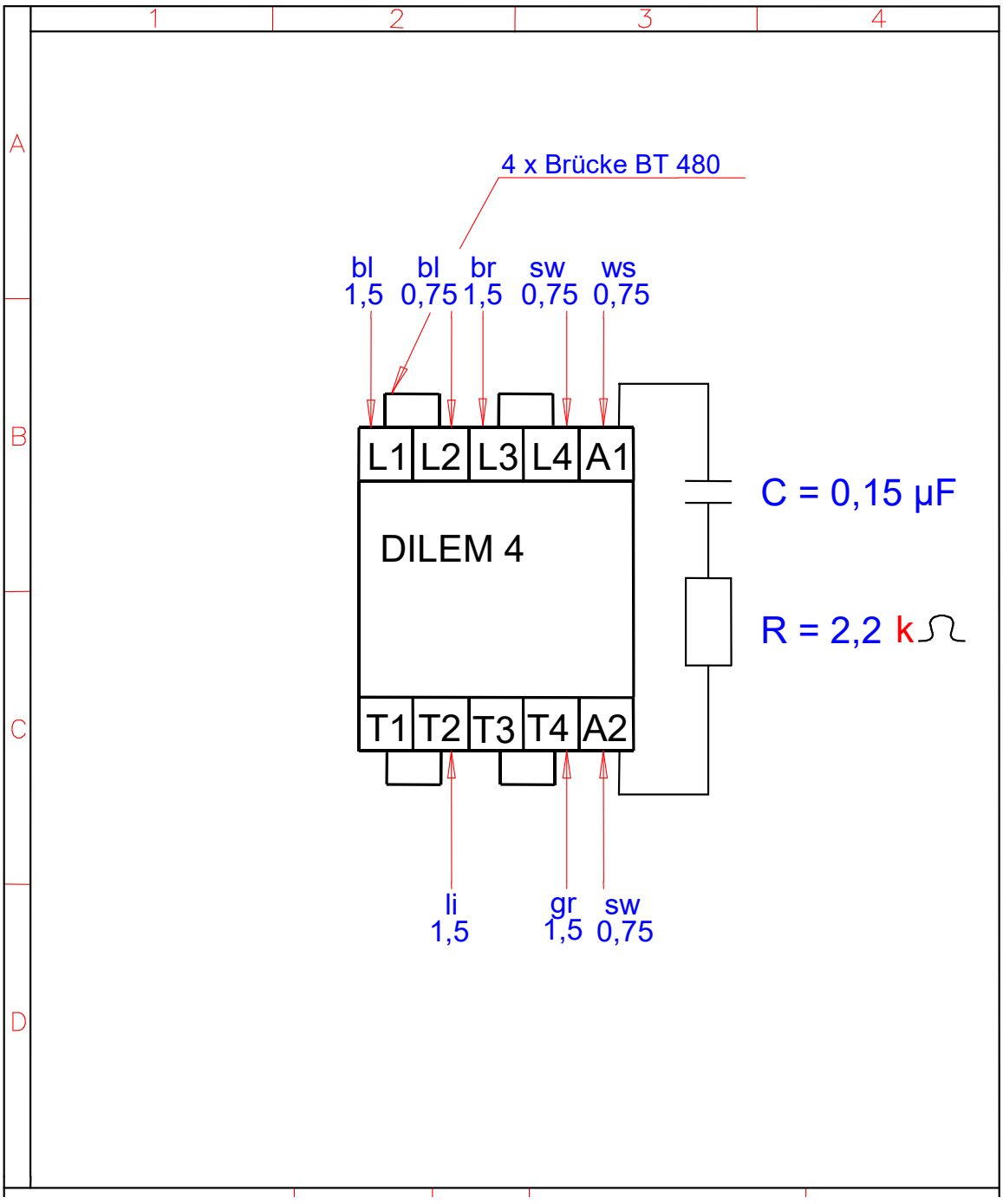

Figure 7.3: Heater- and electrical connections

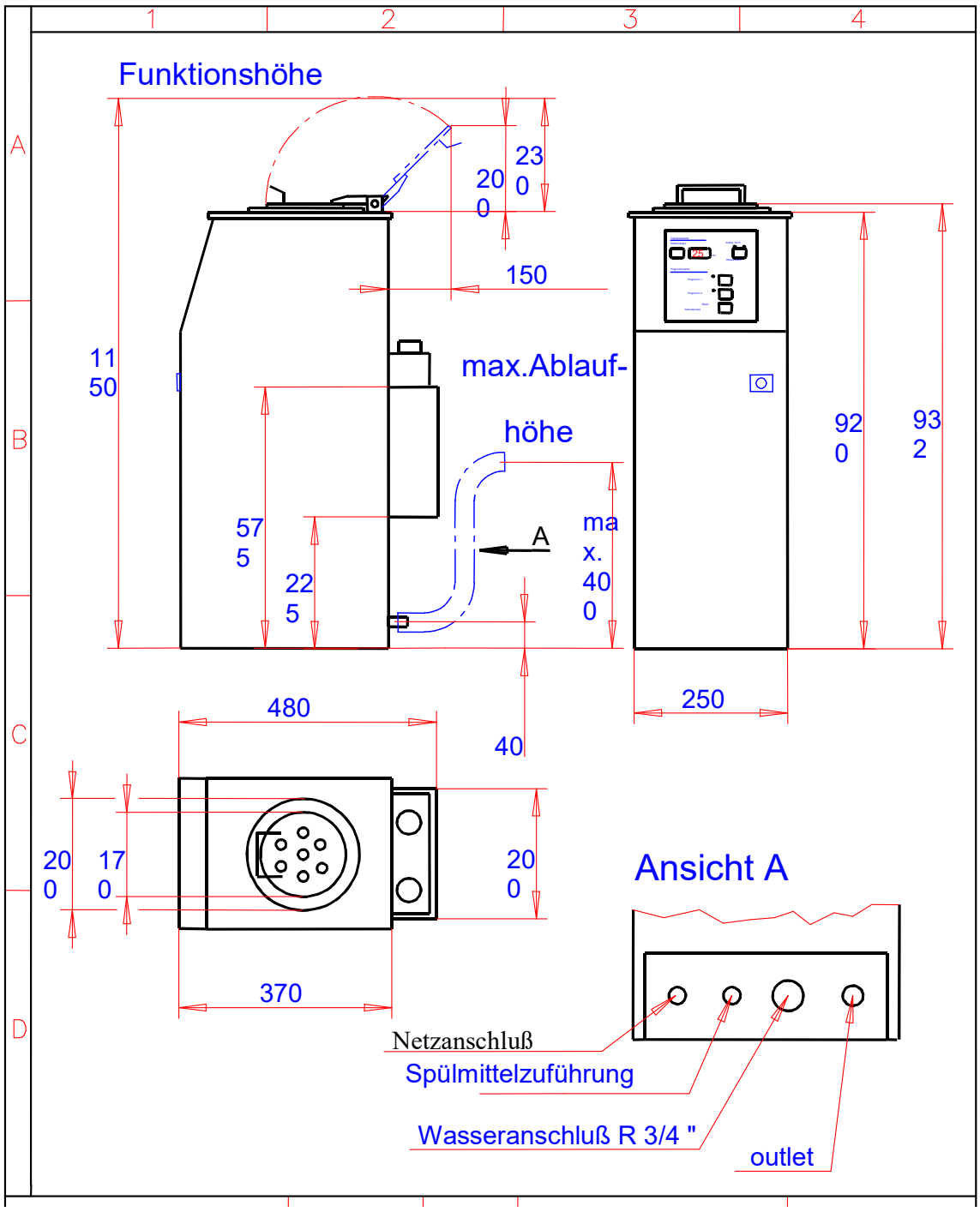

Figure 7.4: Full Presentation