

Operating instructions

Electronic Pipette Washing Machine

EPS/D

I. Preface

The business GEWO Feinmechanik GmbH, Department H. Hölzel is since years a well known firm in the laboratory and research-sector. It is our task with equipment from Hölzel to simplify your routine-work in the laboratory and therefore help to relief the qualified specialist staff.

With the investment in the new pipette washing machine, type EPS/D respectively EPSIII/D you decide yourself for a innovative product. The new EPS generation is a modernised development based on the since years proven pipette washers. The new EPS/D also features besides a very simple handling an low susceptibility against interruption breakdowns. Beyond the functionality of the unit has been improved through a new designed front panel.

In case you belong to our new customers you soon will be convinced from the quality of our washing and drying automates. But have you already tried the strength of our equipment in former times you also count to the broad number of customers who will because of the excellent features of the Hölzel products be open to technical innovations and will again decide for a long living quality product.

In the following you will be guided through the different points of the operating instructions. Should there turn out questions use our Hot-Line. Our well informed employees will always try to answer your questions to your full satisfaction as well as to receive constructive critics.

Hot - Line	Tel.: 0049 / 8122 / 97480
	Fax.: 0049 / 8122 / 974821
	E-mail:Info@gewo.net
	Internet:www.gewo.net

II. Table of contents

1 Description of equipment

1.1. Operation of the pipette washer

2 Your contribution to active environmental protection

2.1 Economical rinsing

2.2 Disposing of transport packaging

3 Safety notices and warnings

3.1 Use according to determination

3.2 Avoiding of injuries

3.3 Avoiding of damage to property

4 Putting the pipette washer into operation

4.1 General notices for setting up

4.1.1 Filling of the detergent container

4.1.2 External supply of demineralised water

4.2 Important operating steps

4.2.1 Alteration of cleaning parameters

4.3 Starting the cleaning procedure

5 Operating the pipette washer

5.1 Starting position

5.2 Insertion of the pipettes

5.2.1 Insertion of Pasteur pipettes

5.3 Filling in of water

5.4 Selecting process parameters

5.5 Washing of heavily soiled pipettes

5.5.1 Pipettes with highly concentrated protein residues

5.5.2 Pipettes for use in cell-cultures

5.5.3 Pipettes with oil or grease containing residues

6 Technical description

6.1 General notes

6.2 Signal indication

6.3 Water filling level

7 Appendix

7.1 Technical data

7.1.1 Loading capacity of pipette washer

7.1.2 Variety of the cleaning parameters

7.1.3 Cleaning programs

1 Description of equipment

1.1 Operation of the pipette washer

The thorough cleaning procedure of the fully automatic cleaning program is controlled by an internal microchip which allows the user to adjustable all important cleaning parameters according to the dirty of the pipettes. The EPS/D is equipped with nine different cleaning programs. Eight of these can be altered in all internal points of the different programs according to the category of dirty. The first cleaning program is not adjustable. So it will be guaranteed that at least one cleaning program is always completely available.

At the lighting up LED's and the given information which is shown on the function control of the front panel the current program-status of the corresponding cleaning-program is anytime recognisable. The function control also signals the user the current temperature in the inner container during the heating of the lye, during the rinsing cycles and also during the drying period of the pipettes. The different rinsing cycles are monitored by a level control, by which the unit operates independently from the water pressure and furthermore a flooding of the rinse-container will be avoided. The water level of the inner container can be preadjusted in the different cleaning programs with the keys on the front panel according to the size of the pipettes to 45 cm or 63 cm.

The thorough cleaning effect of the pipette washing machine results from the principle that in the first step the dirty pipettes are heated up in a specific alkaline cleaning solution of distilled water. For producing of the cleaning lye to achieve a perfect cleaning result it is necessary to use distilled or neutralised water. Normally in household-water there are a lot of dissolved salts. These salts form through the warming-up of the cleaning lye in water undissolvable salts f. x. magnesium or calcium carbonates which then become visible as lime deposits on the pipettes.

The temperature of the cleaning lye is corresponding the category of the dirty adjustable between 30°C – 96°C centigrade in each of the eight different cleaning programs. As well as the temperature also the addition of the liquid detergent is adjustable corresponding the category of the dirty pipettes between 0 ml – 250 ml in each of the eight different cleaning programs.

The dosage of the liquid detergent is working automatically through an integrated pump and a container which provided the liquid detergent. All the cleaning parameters like water level, temperature of the cleaning lye, quantity of the fluid detergent and so on have to be chosen before starting the cleaning cycle. This could be done by the choice of the cleaning program which is corresponding to the dirtiness of the pipettes or by alteration of some of the cleaning parameters itself.

If the cleaning lye reached the adjusted temperature they will be kept on as long as the adjusted heating time between 0 Min. – 120 Min. The cleaning of the pipettes with the alkaline cleaning solution is followed by rinsing of the pipettes. This ensues by the EPS/D with normal household-water or tap water, demineralised water and by the EPSIII/D additionally with bi-demineralised water too. The rinsing cycles are absolutely necessary for a perfect cleaning of the pipettes. During these cycles the dirt particles taken off from the pipettes and the rests of the cleaning solvent are reliably removed and carried out of the inner container. After each finishing of the rinsing cycles the water is completely pumped out from the container and the container is refilled. By the complete emptying of the cleaning container the abducting of dissolved pollution is widely avoided.

Responsible for the high quality of the cleaning process is not only the amount of rinsing cycles. The high quality results mainly from the duration of the rinsing cycles with the different sorts of water. This means especially the effect of the water on the soluble dirt particles between the rinsing cycles. The amount of rinsing cycles, and the time of effecting on the surface of the pipettes through the water can also be adjusted according to the dirtiness of the pipettes (see *7 Appendix*).

After the rinsing cycles are completed the water will be completely pumped out of the container. If the function ***"Drying"*** is activated, the pipettes in the inner-container will be heated to the preselected drying temperature between 80° – 130°C centigrade and dried max. 240 Min.. During the drying time the water dripping from the pipettes is permanently removed by a pump out of the inner-container and led into the sewage system. It has to be kept in mind that the water supply during the whole cleaning procedure may not be interrupted i. e. the water taps must remain open during the complete cleaning procedure to achieve an optimal cleaning of the pipettes.

The water taps must remain open during the complete cleaning procedure to achieve an optimal cleaning result of the pipettes.

Should the pipettes not be dried after finishing the heating cycle and rinsing period, the function ***"Drying"*** must be deactivated in the corresponding cleaning program through alter the parameter

- ***"Drying"***

to value 0 Min. before starting the cleaning process.

This causes that the last rinsing cycle of the whole cleaning procedure, distilled water, remains in the container. Thereby the pipettes stand up to their taking out in demineralised water. The in the container remaining water can be taken for the following cleaning-process again. This enables a economically cleaning of the pipettes. At the lighting up LED's on the front panel is the current program-status of the cleaning-programs anytime recognisable. Is the cleaning process finished all LED's of the different points of the cleaning program and the LED ***"Program complete"*** are lighting up.

Additional the exceptionally thorough cleaning of the pipettes the big advantage of the pipette washing machine, type PSD, is situated in the fact, that these machine is able to take out the whole cleaning procedure independently during the night. So on the next morning the user can disposal about cleaned and dried pipettes. The awkward and lengthy and over it out not harmless handle with chrome-sulphur-acidity escapes consequently.

The function ***"Neutralise"*** is only for the user which will connect the EPS/D or the EPSIII/D to a normal household-water supply. Is the EPS/D connected to a water system with demineralised water, the addition of the liquid detergent is happen automatic through an integrated pump and a container which provided the liquid detergent. If the EPS/D is connected to a normal household-water supply for neutralisation of the water a buffer-solution from the tank-container is additionally pumped to the water. The adding of the *powdery* detergent has to be done in this case manually.

It is not allowed to use the EPS/D which is manufactured for using liquid detergent with buffer-solution. In this case you have to discuss this with us before because we have to alter the program on the microchip.

2 Your contribution to active environmental protection

2.1 Economical rinsing

In the cleaning program between the rinsing cycles pauses should be integrated by the user which cause an effecting on the surface of the pipettes through the water in the inner-container. These pauses cause the water need of the cleaning unit to be decisively reduced so that a permanent rinsing of the pipettes to be cleaned can be avoided. Furthermore the cleaning quality is decisively aided by this effect, because in the rinsing pauses the water can have a better effect on the already detached soiling particles. So it is obtained that the operation of the pipette washer is water and energy saving.

In addition you can contribute to the economising of your equipment if you take the following suggestions into consideration.

- Connecting the pipette washer to a hot water system leads to a saving of energy, because the heating time could be shortened. In case you still prefer a hot water supply, you should discuss this intention with us before. If the running-in temperature of the water is higher than 60° centigrade the built in solenoid valves can be overheated. In the following there can be considerable malfunction of the valves. Furthermore they are another supply line hoses for the water connection required which are suitable for warm water.
- Fully exploit the capacity of the rinsing container without overloading it (max. 8 fully load boxes). See step *5.2 Insertion of pipettes*. So you rinse most economically and therefore contribute to a careful dealing with vital resources.
- If possible avoid to rinse pipettes of different lengths. By this you are forced to conduct the rinsing with high water level (63 cm).
- The measuring of the liquid detergent should be chosen according to the degree of soiling of the pipettes. In general a quantity between 100 ml – 250 ml by an high water level (63 cm) and about 70 ml – and 150 ml by an low water level (45 cm) of fluid detergent is sufficient. In general the amount of the detergent should be fitted to the dirty of the pipettes.

Too much or unsuitable detergent can lead to a boiling over of the cleaning leach. At this point it is said that the special Hölzel liquid detergent is free from phosphates and also are over 90% biological decomposable. By a proper and correct use of the detergent the sewage will not be loaded unnecessarily and the environment will be taken care of.

2.2 Disposing of transport packaging

The intention of a costly packaging of technical products is to beware the equipment from transport damages. Because of a distinctive environmental feeling the firm GEWO Feinmechanik GmbH attaches great importance that the packaging materials are chosen according to environmental amicability and waste managemental criteria i.e. they can be recycled.

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

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

NOTE:

Important transport information for the EPS/D and EPSIII/D:

For transportation of an already used unit, the supply tank has to be completely emptied before. The black cap of the valve have to be assembled on the supply tank again or the tank have to be removed out of the pipette washer through an authorised expert.

Remove the front sheet-metal by opening the screws on the top of the unit. Now the user have to open the coupling between the supply tank and the pump for the detergent. Now the tank can be taken out of the pipette washer.

3 Safety notices and warnings

This unit in general conforms to the prescribed safety rules of DIN EN 292-2. (German industry standard). But improper use of the unit can lead to damage to people and objects.

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

NOTE:

Always keep the operating instructions at hand!

3.1 Use according to determination

- 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 used to clean pipettes with which, without any further treatment, liquids are to be carried which come into the human organism.

3.2 Avoiding of injuries

- The unit is only then electrically safe if it is connected to a ground system installed to regulations. This fundamental safety rule must be present 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 made liable for damages which are due or were due to a faulty or interrupted ground lead. (f. x. electrical shock).

WARNING:

Never use the pipettes washer without a ground lead ! Danger to operators life could result !

- The units are built for connection to a power socket with ground connection which is fused with a 16 Amp. slow blow fuse. For safety reasons i. e. danger of overheating it is illegal to use extension cords. 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 consumer of electricity is connected. Repairs should not be performed without first having consulted the manufacturer, after that the repairs should be performed only by authorised experts. By improperly performed repairs damage to the unit or to people could originate for which the manufacturer cannot be made liable.

CAUTION:

- For maintenance and repairs always disconnect the unit from the power line.
- 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 consumer of electricity is connected.
- A damaged unit can endanger your safety. Therefore the unit has immediately to be shut down and the manufacturer is to be informed.

- Fill into the washing container besides the provided liquids like water only selected *detergents* (Standard: *Helimatic Cleaner alkaline from B. Braun*). **Do not add any additional solvents or detergents.**
- During or immediately after completion of the cleaning cycle do not grab into the washing container and/or touch the metal of the cover to avoid burnings. Also taking out the cleaned pipettes after ending of the cleaning cycles should be wait until the temperature in the inner container is below about 50 °C. After finishing the cleaning process all LED's of the different points of the cleaning program and the LED "**Program complete**" are lighting up. If the temperature in the inner container is beneath 50 °C centigrade the LED's are going out and the current cleaning program is reset. With operating the green "**Start – Key**" the current cleaning program could now be started again. If the cleaning process is finished the program could also reset by operating the "**Stop – Key**". By participation the "**Stop – Key**" on the keyboard the cleaning process is interrupt and all cleaning parameters will be reset. The cleaning process could now start again.
- The safety and danger notices for the use of the detergent agent are strictly to be observed. See also the safety notices on the label of the detergent package.
- The water in the inner container is not drinkable !
- Pay attention to a safe standing of the part the pipette washer is put on. For this reason the unit shall be placed on a stable, not interrupted base.
- The detergents and neutralising agents must be kept separate from food, beverages and animal feed. They shall not come into contact will eyes or skin. The detergents, if improperly used can lead to etchings and irritation of the respiratory tracts. During work suitable protective cloths, gloves and goggles resp. a visor has to be worn.
- 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 unease in felt see quickly a physician and show the security label.
- Cleaning or neutralising agents never shall come into the reach of children !

3.3 Avoiding of damage to property

- Make sure that voltage, frequency and fusing of the powerline to which you want to connect the washer correspond with the details on the identification plate.
- Detergents proposed by the manufacturer normally lead to perfect rinsing results. Therefore it is advisable to obtain the detergent from the manufacturer. Using customary detergents the result of the rinsing can be influenced negatively. f. x. after a short time different detergents remove the paint from the graduations of the pipettes or leave a thin alkaline film on the surface of the pipettes.

The manufacturer cannot be made liable for damages to objects or persons which occur by the use of detergents or buffer solution which are not proposed by the manufacturer.

- Glass splinters and broken pieces of pipettes immediately have to be removed carefully after the end of the rinsing cycle and the cooling off of the unit. Glass splinters also in small quantities can lead to a reduced water drainage and therefore can lead to a damage of the unit. Already in very small quantities glass splinters can negatively influx the function of the pump integrated in the unit. Condensed steam on pipettes and cover of the housing after completion of the cleaning cycle can be signs of reduced water drainage.

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

- Closing of the faucet during longer rinsing pauses (f. x. annual holiday)
- Glass splinters of broken pipettes can lead to a blocking of the drain and so negatively influx the water drain. Furthermore the glass splinters of broken pipettes can reduce the cleaning effect (limited function of the pump).
- The water connection at the unit and the supply line shall be inspected in regular intervals for tightness, e. g. all 3 months.
- The unit should not remain water filled for a longer period of time. Because by this the diaphragm of the level regulator is kept under load and this could lead to a deformation of the diaphragm. Such a fault can be recognised by overflowing i. e. non turning off of the water flow when the normal water level is reached. In this case the unit at least shall be filled twice with water and be emptied twice until the diaphragm of the level regulator has backformed again.

The manufacturer cannot be made 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 notices for setting up

Put the unit into the desired position and determine the lengths and the elbows of the drain hose. Use the enclosed couplings and ring clamps. The pipette washer is, according to the attached drawing (see 7 Appendix) to be placed in the vicinity of a water drain or a large basin. The drain hose should be placed directly into a drain tube or led into a larger basin. If the drain hose has to be installed in a 90° direction from the present direction when the unit is put into operation this must be done with the attached couplings and elbows to definitely avoid bending of the hose. At the same time the drain hose is to be shortened to a favourable length. Pay attention to a sufficing safeguard of the drain hose through the enclosed hose-clamps.

Now put the prepared drain hose without any bending into the desired position. The maximum height of the drain hose should be not more than 400 mm above the bottom of the unit because the built-in water overflow control otherwise will be affected in its function. Place the unit into the planned position and slide the black rubber hose over the metal nozzle on the rear side of the pipette washer. Now secure the installed drain hose with the big ring clip delivered with the unit. The drain hose should be controlled in a period of about 6 months if they is free from any bending. Pay attention to a safe standing of the part the pipette washer is put on. For this reason the unit shall be placed on a stable, not interrupted base.

Then connect the water supply hoses to your water supply system corresponding their identification normal household water W1 and demineralised water W2 and by the EPSIII/D additionally bi-demineralised water (W3). By the assembly of the grey water supply hoses might the in the connections integrated seals not be bend because otherwise the thickness of the hoses are not guaranteed. The minimal water pressure which is needed have to conduct at least 0,5 bar. The maximum water pressure should not exceed 6 bar during the whole cleaning process. Test the water supply connections by a short closing of the faucet during the filling of the inner container with water.

The connections for W1, W2 and by EPS III W3 should not confused by no means otherwise the function of the unit is picked up.

After a power loss in the unit the program used again active and restarted the cleaning process again. The interrupted cleaning point, e g. "*Drying*" is reset and started automatically and execute the cleaning process. The absolute running time of the interrupt program will be lengthened accordingly.

4.1.1 Filling of the detergent container

Before running the EPS for the first time the black cap of the valve in the supply tank for the fluid detergent have to be removed. For this the swing-mechanism integrated into the front-sheet metal is through pulling on the grip to operate. After this the black cap between the two yellow covers could be removed.

The tank for the fluid detergent is by setting the unit into operation empty. Fill the supply tank carefully with the funnel included into the operating environment. To filling of the detergent container is the swing-mechanism, integrated into the front-sheet metal, through an pulling on the grip to operate.

To the filling occurrence the supply tank must not remove out of the unit.

To the filling of the supply tank the user have to remove the yellow tank cover on the left side of the supply tank on which is nothing installed. Use the „filling aid“ (funnel) packed with the equipment. Now carefully fill the supply tank with the liquid cleaning detergent observing the safety notes given in chapter 3.2 Avoiding of injuries.

The supply tank must not filled completely. To the above rim of the tank must be at least a space of about 4 cm. The maximum amount of fluid detergent in the tank should not exceed 5 litres. The EPS/D should only be operated with the liquid detergent "*Hölzel-Spezialspülmittel*" of the company H. Hölzel.

To run the pipette washer the black cap from the valve between the two yellow lids should be removed. Spilled quantities should immediately be removed from the unit, supply tank and other devices in the vicinity.

Manners the users of the pipette washer necessarily on the formal dealings with the detergent and the filling of the supply tank too.

The user will be indicated through "**Spülmittelmenge**" in the function control of the front panel if there is only about one litre of fluid detergent in the container left.

In spite of this the cleaning process could be started by operating the green "**Start – Key**".

4.1.2 External supply of demineralised water

In case the water pressure at hand is lower than 0,5 bar. The H. HÖLZEL GmbH offers a supplementary pump which ensures on optimal function of the pipette washer even if the water pressure is very low. This is as a rule the case if the demineralised water is available only in supply containers and not in pipe systems under pressure.

By an pipette washing machine with an external demineralised water pump the water connection ensued with the at the external pump on the pressure-side fixed transparent connection-hose. A direct connection of the pipette washing machine to a demineralised water supply results consequently not. The connection-hose at the suck-side of the pump is connected with a filled distilled water-basin.

To begin of the cleaning-process the user has always to provide for a sufficient filled distilled water-basin with at least about 150 litre and a permanent water-pressure with at least 0.5 bar. Otherwise the cleaning process of the pipettes can not be started or the process will not be completely executed.

4.2 Important operating steps

- a) The pipette washing machine type EPS is equipped with an automatically working dosage for liquid detergent. The EPS/D is offered with two sorts of water (water W1 and water W2) or three sorts (water W1, water W2 and water W3). Both EPS/D are equipped with nine different cleaning programs. Eight of these cleaning programs could be altered in each parameter of the whole cleaning program corresponding to the kind of dirty. Cleaning program 1 is not adjustable. So it will be guaranteed that at least one cleaning program is always completely available. For more information about the contents of the different cleaning programs are see *7 Appendix*.
- b) Open the water faucets and check connections of the water supply hoses and the drain hose for tightness if it is necessary. Turn on main switch on the front sheet of the unit.
- The green lamp in switch will light up

On the front panel the LED's of the different parameters of the whole cleaning program, e. g. Water Inlet, Tap Water and so on, are lighting up. Consequently the user will be indicated the content of the last activated cleaning program by lighting up the LED's and the information which is shown in the function control of the front panel.

Line 1: *Programm 2 bereit* (Number of the last activated cleaning program)

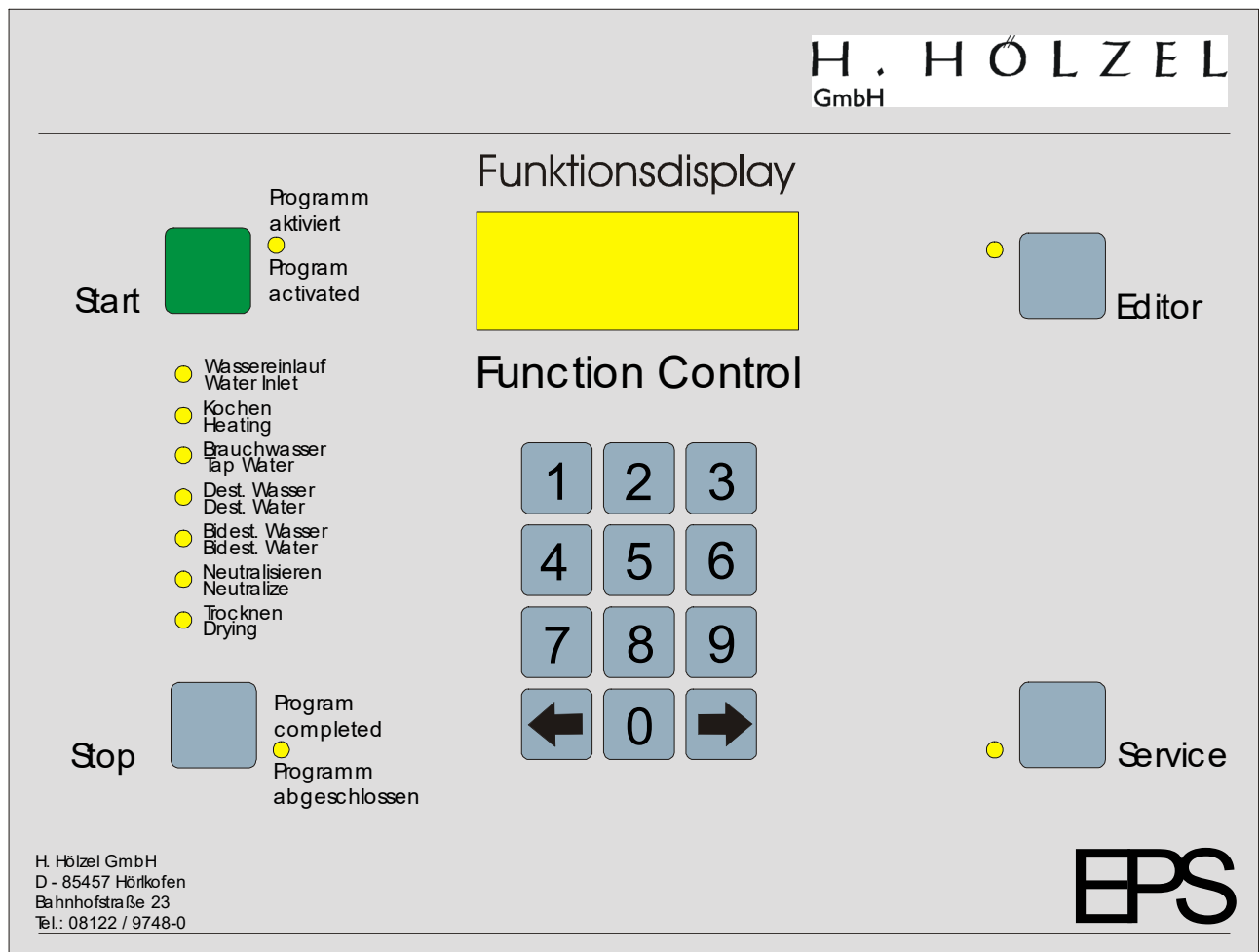
Line 2: *Start – Taste drücken*

Line 3: *Spülmittel-Menge* (only when there is about one litre of liquid detergent is left in the tank)

Line 4: *Temperatur 16 °C* (Indicates the current temperature in the inner container. This information is shown on the front panel during the whole cleaning process)

The information which is indicated in the function control shows the user to each period of time the current status of the cleaning program.

Trough operating he green "**Start – key**" on the front panel the cleaning process will be started with the program which is indicated in the function control. All LED's are going out and only the LED of the current program point, e. g. *Water Inlet* is lighting up.



Picture 1: front panel EPS/D

- c) Connect water W1 (tap water or household water), W2 (distilled water) by an EPSIII/D additionally W3 (bi-distilled water) and the drain hose on the unit. Pay attention to a sufficing safeguard of the drain hose through the enclosed hose-clamps. By the assembly of the grey water supply hoses might the in the connections integrated seals not be bend because otherwise the thickness of the hoses are not guaranteed.

 - d) Trough pressing the green ***“Start - key”*** on the front panel the cleaning process will be started. The activating of the cleaning program is indicated by the respective LED ***“Program activated”***. After a power loss in the unit the program used again active and restarted at the interrupted position automatically and execute the cleaning process. The absolute running time of the interrupt program will be lengthened accordingly. The different worked up cleaning cycles e.g. water inlet, heating of the cleaning lye, are the user signalled by the shining up of the corresponding LED on the front panel. Through pressing the grey ***“Stop - key”*** the cleaning program will be interrupted and reset. Now the parameters of the cleaning program could be altered corresponding to the wishes of the user and restarted again through operating the green, ***„Start - key”***. The container now will be filled with demineralised water (W2) if the inner container is empty.

 - e) With the ***“Arrow - keys”*** the user choose the required cleaning program, according to the dirty on the pipettes All the different cleaning programs are programmed with long tested values. Nevertheless all the different cleaning parameters could be altered in each cleaning program according to the wishes of the user. Only the cleaning parameters of program 1 are fixed.
- ⇒ By operating these button „→“ the user go forwards through the different cleaning programs. The chosen cleaning programme will be indicated in the function control of the display.

⇒ By operating these button „←“ the user go backwards through the different cleaning programs. The chosen cleaning programme will be indicated in the function control of the display.

The cleaning program could also be adjusted directly by operating the keys between 1 – 9 on the front panel to choose the according number of the cleaning program which is required.

- f) The required ***water level*** could be adjusted before starting the cleaning process between high water level (about 65 cm above the container bottom) and low water level (about 45 cm above the container bottom) in the according cleaning program which was selected. To the first operating of the pipette washing machine choose a program with a low water level, e. g. cleaning program No. 5.

Start now the cleaning process by operating the green ***“Start – key”***. If the water level reached the appointed water-height of about 45 cm the water inlet will be interrupted and the cleaning process started automatically with the heating of the cleaning lye. At this position a singular control of the water level should be executed from time to time. Make sure that the low water level after the filling of the container is about 22 – 26 cm below the upper rim of the container. Press the grey ***“Stop – key”*** and choose another cleaning program with an high water level by operating the ***“Arrow – keys”*** e. g. cleaning program No. 6 and start the cleaning process again.

After starting the new cleaning program, by operating of the green ***“Start – key”***, the water inlet starts again up to the high water level. After finishing the filling of the inner container the cleaning program remain still active, therefore the cleaning program should be deactivated with the grey ***“Stop – key”***. Control the high water level and make sure that the high water level after filling the unit is approx. 6 - 12 cm below the upper rim of the container.

- g) The function „**Neutralise**“ is only for these units activated, which are manufactured for the connection to a normal household water supply.

⊗ In this case the user have to fill in the tank, which normally provides the unit with liquid detergent, instead of the liquid detergent the buffer solution. After dosing of the neutralising agent and finishing the water supply of the unit, the addition of the powdery cleaning agent is done manually. For this use the vessel delivered with the unit. According to the degree of soiling of the pipettes fill approx. 50 - 75 gr. powdery cleaning agent into the cleaning container. So that the efficient of the pipette washing machine in the case of an manually dosage of the powdery detergent will be guaranteed, it is strictly forbidden for the user to give the detergent in the container when there is no water in it. The quantity of the powdery „*Hölzel-Spezialspülmittel*“ detergent should amount between 50 gr. – 100 gr.. After the end of the filling-process of the container with water, the user have to dosage the detergent manually during the cleaning cycle of boiling the cleaning lye „**Heating**“ is activated. The LED „**Heating**“ is lighting up.

Please observe that in no case neutralising agent may be filled into a supply container 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 defects.

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

Important parameters of the cleaning process are mainly

- the temperature of the cleaning lye in a range between 30° - 96° C centigrade

and

- the quantity of the fluid detergent between 0 – 250 ml. Too much or wrong detergent can lead to a boil-over of the cleaning leach and could cause damages on the unit. When handling the cleaning agents always observe the safety notices given under *3.2 Avoiding of injuries*. The combination of powdered detergent and water with a high content of dissolved salts like f . x. magnesium or calcium carbonates in it can lead to an impairment of the cleaning result. In these cases we advise the activation of the automatic dosage with the liquid detergent.

The dosage of the liquid detergent should amount between 100 ml - 250 ml. With an average amount of about 40 litres water in the container a concentration of approx. 0,25 % is reached when about 100 ml are added. This concentration is completely satisfactory with respect to the amount of cleaning agent. The concentration of the detergent in the cleaning lye should not exceed 1 % at all.

Check in regular intervals the remaining quantity of the cleaning resp. in the stock container.

The cleaning effect of the washer is so effective that, using a too high concentration of detergent leach poor colour deposits can be removed from the graduations of the pipettes. Therefore it is advisable to use no pipettes with colour deposits but those with considerable longer lasting brown diffused-in graduations. In general it can be said that the durability of the brown graduations is as long as the tenability of the pipette.

Manufacturers of pipettes with brown graduations are listed in chapter 7 *Appendix*.

The user has the possibility to alter corresponding to the dirt on the pipettes the parameters of the different cleaning programs. Only the cleaning program No. 1 is fixed. In the program-point of the detergent quantity 0 ml entered, the cleaning program will be executed without any addition of liquid detergent. An operating without any detergents can lead to a impairment of the cleaning-quality.

If there is about 1 litre fluid detergent left in the supply tank, in the third line of the of the function control "*Spülmittel-Menge*" is blinking. This signifies the user, that the supply tank should be refilled before starting the next cleaning process with the same "*Helimatic Cleaner alkaline*" fluid detergent again. The started cleaning process is executed however without any impairment of the cleaning result.

- i) Through an conscious application of the pause-times, e. g. about 15 minutes, between the single rinsing cycles becomes the rinsing water on the one hand a better exploits and contributes therefore consequently to a responsible dealing with the resources. On the other hand the cleaning-effect of the pipette washing machine will be improved because of the cleaning effect of the water into the soiled pipettes is increased.
- j) Install a short-instruction list nearby the unit. Keep the operating instructions always in the immediate vicinity of the unit.

4.2.1 Alteration of cleaning parameters

Controlling and Alteration of cleaning parameters:

- 1) Choose the number of the cleaning program which parameters should be altered by using the ***"Arrow – keys"*** or by directly operating the keys between 1 – 9 on the front panel to choose the according number of the cleaning program which is required.
- 2) Operate the ***"Editor – key"***. The corresponding LED is lighting up.
- 3) Go through the cleaning program by operating the ***"Arrow – keys"*** step by step until the parameter which should be altered is indicated in the display of the function control.

- 4) Operate the ***"Service – key"***. In the display of the function control appears „*Neuer Wert ?*“

Now the user have to enter the new value step by step by using the ***"Arrow – keys"*** or by directly operating the keys between 1 – 9 on the front panel.

- 5) Now the user have to confirm the new value by operating the ***„Start – key"***.
- 6) Are all parameters altered and each of them was confirmed by the ***„Start – key"*** the alteration of the cleaning program will be finished by operating the grey ***"Stop – key"***.

In the display of the function control appears „*Speichern...*“

Now all carried out alterations of the cleaning program are activated.

4.3 Starting the cleaning procedure

- 1) Choose the required cleaning program or alter, if necessary, some parameters of the corresponding cleaning program.
 - a) Press the „**Stop - key**“ about to reset activated cleaning parameters.
 - b) Open water taps and check connections for tightness. Turn on the main switch.
 - The green lamp in switch will light up
- 2) In the display of the function control the chosen cleaning program are indicated.
 - The function **“Neutralise”** is not activated for cleaning units which are manufactured for using only fluid detergent.
 - During the heating of the cleaning lye and also during the whole cleaning process the current temperature in the inner container is indicated permanent in the display of the function control.
- 3) To begin of the cleaning-process the user has always to provide for a sufficient filled distilled water-basin with at least about 150 litre and a permanent water-pressure with at least 0.5 bar. Otherwise the cleaning process of the pipettes can not be started or the process will not be completely executed.
- 4) Adjust the required program parameters, like:
 - Water level (low / high)
 - with low water level the level should be approx. 46 cm above the container bottom.
 - with high water level make sure that the water level after filling is approx. 8 - 15 cm below the upper rim of the container.

- Drying or non drying of the pipettes
- Amount of automatically dosage of fluid detergent (recommended quantity between 70 - and max. 250 ml).
By an PSD without an activated automatically dosage the user have to give the detergent manually in the container.
- Chose the temperature of the cleaning lye.
The temperature of the cleaning lye could be chosen variable between 30°C – 96°C centigrade.

5) Starting the cleaning-process through an operating the green „**Start - key**“. The container now will be filled with demineralised water (W2).

Is in the program-point of the detergent quantity 0 ml entered, the cleaning program will be executed without any addition of liquid detergent. An operating without any detergents can led to a impairment of the cleaning-quality. All cleaning parameters have to be chosen before starting the cleaning process according to soiling and length of pipettes to be cleaned. During running off the cleaning program only the **“Stop -key”** is activated. During the running program a use of keys on the front panel is ignored by the control of the pipette washer. Only by operating the **“Stop -key”** the running program can be stopped.

Operating the **“Stop”** - key causes the cleaning program stops immediately. The LED of the respective program cycle goes out. All other settings remain activated, but can be altered before a new start of the program.

After the filling with demineralised water (W2) and the automatically dosage of fluid detergent the cleaning leach will be heated. With operating it, the switching of the heating protector is audible.

Make sure that during the emptying procedure the container should be completely empty after approx. 2 minute but at least after 3 min. If this should not be the case, the drain hoses have to be inspected for kinks, blockage etc..

5 Operating the pipette washer

5.1 Starting position

Before every rinsing operation check the following points.

- Turn the main switch off. The green lamp in switch will light up.
- Is the tank sufficiently filled with cleaning - resp. buffer solution ?
- Open the water taps and check connections for tightness.

After completion a successful starting of the pipette washer, the cleaning of the pipettes can begin according to soiling and length of pipettes to be cleaned.

5.2 Insertion of the pipettes

Pipettes fundamentally must stand with their pointed part on top in the boxes delivered with the unit ! Open the cover of the pipette washer and put the containers with their handle grips upward into the rinsing container of the unit.

Furthermore they should have free passages and be free from solid in water insoluble blockages. To the filling of the pipette washing machine you give the pipettes into the containers of it. Open the cover of the pipette washer and put the containers with their handle grips upward into the rinsing container of the unit.

Are there many pipettes in the boxes they unit are allowed to fill only with 8 boxes instead of 9. Therefore it will be better for the cleaning result to fill the boxes only loosely with pipettes so that the necessary spaces for air circulation for the cleaning remain preserved.

The principle of the cleaning process requires, that the warmed up air of the heating unit could rise unobstructed between the pipettes and the containers too. A heat built up in the containers has definitely to be avoided.

This is absolutely necessary that the cleaning and drying of the pipettes is optimal and the pipettes do not become damaged (cracks at the mouthpieces of the pipettes).

Containers which are filled very densely can lead to a restricted cleaning-result, because of the tight situated pipettes the cleaning-leach could not act effective into the contamination's.

Make sure that the heat can distribute unhindered in the inner container. Fill the containers only loosely with pipettes so that the necessary spaces for air circulation for the cleaning remain preserved. Make sure that the heat can distribute unhindered in the internal container.

5.2.1 Insertion of Pasteur pipettes

To prevent the Pasteurpipettes to swim up, these pipettes have to be cleaned in a special container with a sieve cover. These special containers can be ordered normally as special accessories.

5.3 Filling in of water

Before starting the cleaning process the user have to choose the water level (about 45 cm or 63 cm). After choosing the other parameters of the cleaning process, the cleaning sequence is started by an operation of the ***"Start - key"***. The empty container of the unit is now filled with demineralised water (W2). The choice of the cleaning program or different cleaning parameters are depending on the pollution of the pipettes or the runtime of the cleaning program itself

In case the line water pressure drops below 0,5 bar the water supply is interrupted. If the water line pressure is sufficient again the program starts again at that point it was interrupted. This makes sure that the cleaning affect is always from the same quality regardless of varying water pressure. Avoiding a water pressure higher than 6 bar.

5.4 Selecting process parameters

Mostly all important parameters of the cleaning programs could be programmed before starting the cleaning process independent of other cleaning-parameters of the EPS/D or EPSIII/D. The programmed values in the different cleaning programs are proven since years ago.

Between the individual rinsing cycles the water can, in the so called rinsing pauses, more effectively affect the loosened dirt particles from the pipettes and also reliably remove rests of the cleaning agent from the pipettes and from the rinsing container. With the time the pipettes especially their tips, remain in the rinsing water the cleaning effect is increased because of the longer time, and also the amount of rinsing water is considerable reduced, because the amount of necessary rinsing cycles is reduced to a minimum. After pumping out of the last content of the container, the container is heated to dry the pipettes.

By an insufficient water-pressure (lower than 0.5 bar) the cleaning process is interrupted as long as the required water-pressure has guaranteed again. In order to this the cleaning result is independent of the water-pressure always constant. This is especially interesting for users who get their water demand, especially the demineralised water, only out of supply containers and not out of a pipe system which stands constant under pressure.

5.5 Washing of heavily soiled pipettes

Pipettes soiled with silicon cannot be cleaned optimally with common cleaning agents. In every case these pipettes have to be treated separately. Only one pipette soiled with silicone can heavily reduce the quality of the complete cleaning process.

In case one or more silicone soiled pipettes inadvertently have been cleaned and therefore the quality of cleaning is not sufficient, please proceed as follows:

1. Increase the quantity of the cleaning agent 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 under 1. above is not successful the pipettes shall be freed from the silicone cover as follows:
 - a) Cleaning with solvents, f. x.
 - Chloride hydrocarbons
 - Toluene or benzene

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

- b) Cleaning with cleaning agents which are strong alkali. Repeat the cleaning procedure several times using plenty 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.

5.5.1 Pipettes with highly concentrated protein residues (f. x. dairy farming)

Here one has to pay attention that the used pipettes immediately are soaked in a mild solution of rinsing agent, to prevent the protein residues from drying on.

The temperature of the cleaning lye should not increase 40°C centigrade. For the cleaning of pipettes with protein residues the user can choose the cleaning program No. 7, because there the temperature of the cleaning lye is programmed about 40°C centigrade.

5.5.2 Pipettes for use in cell-cultures

It should be taken care, that exclusively H. HÖLZEL rinsing agents are used. Additionally cleaning program No. 1 should be selected, to get an optimal effect of the water in the rinsing pauses. Not the frequent water change but the length of time the glass surface is in the rinsing water is decisive for the quality of the pipette cleaning. So spreading of traces of rinsing agent can be excluded. If it is necessary the user have to increase the amount of the dosage of the liquid detergent.

5.5.3 Pipettes with oil or grease containing residues (lubricant or food industries)

Pipettes containing oil or lubricant residues in every case shall be soaked, before the main cleaning process, in a strong detergent solution or in extreme cases in benzene or similar cleaning agents. With grease residues normally the soaking of pipettes in a detergent solution is satisfactory.

6 Technical description

6.1 General notes

The EPS/D and the EPSIII/D are equipped with a internal service function. With these function a authorised technician have the possibility to check important functions of the pipette washer.

Through operating the **"Service – key"** on the front panel appears in the display of the function control:

- 1. line: *Servicefunktionen*
- 2. line: *Mit Start aktivieren*
- 3. line: number of the corresponding service function, that means:
 - 1. Niveau einstellen (*adjust the water level*)
 - 2. Abpumpen (*emptying the inner container*)
 - 3. Relaistest (*test the relay board*)
 - 4. Komponententest (*test of the equipment*)
 - 5. MV (Magnetventile) auf (*Opening of the solenoid valves*)
 - 6. Ausheizen (*Heating the unit to dry the inner container*)

By operating the **"Arrow – keys"** the user have the possibility to go step by step through the *Servicefunktionen*. The most important function for the user is in this case to have the possibility to emptying the inner container when ever it is necessary. The *Servicefunktionen* will be activated by operating the green **"Start – key"**.

The *Servicefunktionen* are appropriate to avoid repair costs too. For the inspection of the first set up and also with a general check it should be proceeded exactly according to the notes given in chapter 4 *Putting the pipette washer into operation*.

Possible putting up faults or functional troubles arising later, as a rule can so quickly be discerned and localised. For this reason it is then mostly without problems to give hints for a successful remedy of faults or to propose or start an eventually necessary repair.

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 ensured by a solenoid valve, which needs a water pressure of 0,5 to 6 bar. The sucking out of the remaining water is done by a pump integrated in the unit. The function of this evacuation process can be noticed by the sucking noise of the pump and the coming out of water through the drain hose.

During the complete rinsing program, the water taps have to be open

All units are equipped with a temperature limiter which avoids a temperature rise over 150° centigrade.

6.2 Signal indication

The LED's lighting up in the front panel and the information in the display of the function control show the respective program parameters. This enables the operator to inform themselves at every time about the status of the activated cleaning program.

6.3 Water filling level

The maximum water level is set by the manufacturer to a distance of approx. 8 - 15 cm from the upper rim of the rinsing container. Should the water level f. x. by ageing of the pressure diaphragm, raise critically i. e. the minimum distance to the container rim is fallen below 5 cm, a readjustment of the pressure diaphragm is necessary.

The readjustment should only be done after telephoning with one of the service technicians of the manufacturer.

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

7 Appendix

7.1 Technical data

operating voltage	220/230	Volts AC
current	13,5	A
power consumption	3,0	kWh
energy consumption	ca. 7 (4,9)	kWh
fusing	16	(slow blow)
max. incoming water temperature	60	°C

water level max.	63 (45)	cm
water pressure min-max	0,5 - 6	bar
water quantity in container	45 (30)	litre
water consumption		
normal household water W1	depending on the cleaning program	
demineralised water W2	depending on the cleaning program	
detergent consumption	about 70 - 250	ml

cleaning temperature	30 - 96	°C
cleaning (heating) time	depending on the cleaning program	
rinsing program for two sorts of water		
normal household water (W1)	depending on the cleaning program	
demineralised water (W2)	depending on the cleaning program	

drying temperature	max. 130 °C	
drying time	max. 240	min.
<i>cleaning process:</i>	<i>depending on the cleaning parameters</i>	
quantity of baskets max.	9	piece
dimensions of the baskets	80 x 80 x 330	3 piece
	80 x 80 x 415	6 piece
Depth	ca. 530	mm
Width	ca. 320	mm
Height	ca. 920	mm
Weight	ca. 50	kg
Material	1.4301	

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 cooking time and maximum drying power.

Manufacturers of diffused-in pipettes with brown undestroyable and absolutely permanent graduation, (As far as known to us at this time):

K. Hecht, 97647 Sondheim

Marienfeld, 97980 Bad Mergentheim

Scherf-Präzision, 97645 Ostheim/Urspringen

D. Erhardt, 63225 Langen

7.1.1 Loading capacity of pipette washer

The given values are empirical and refer to max. 9 baskets.

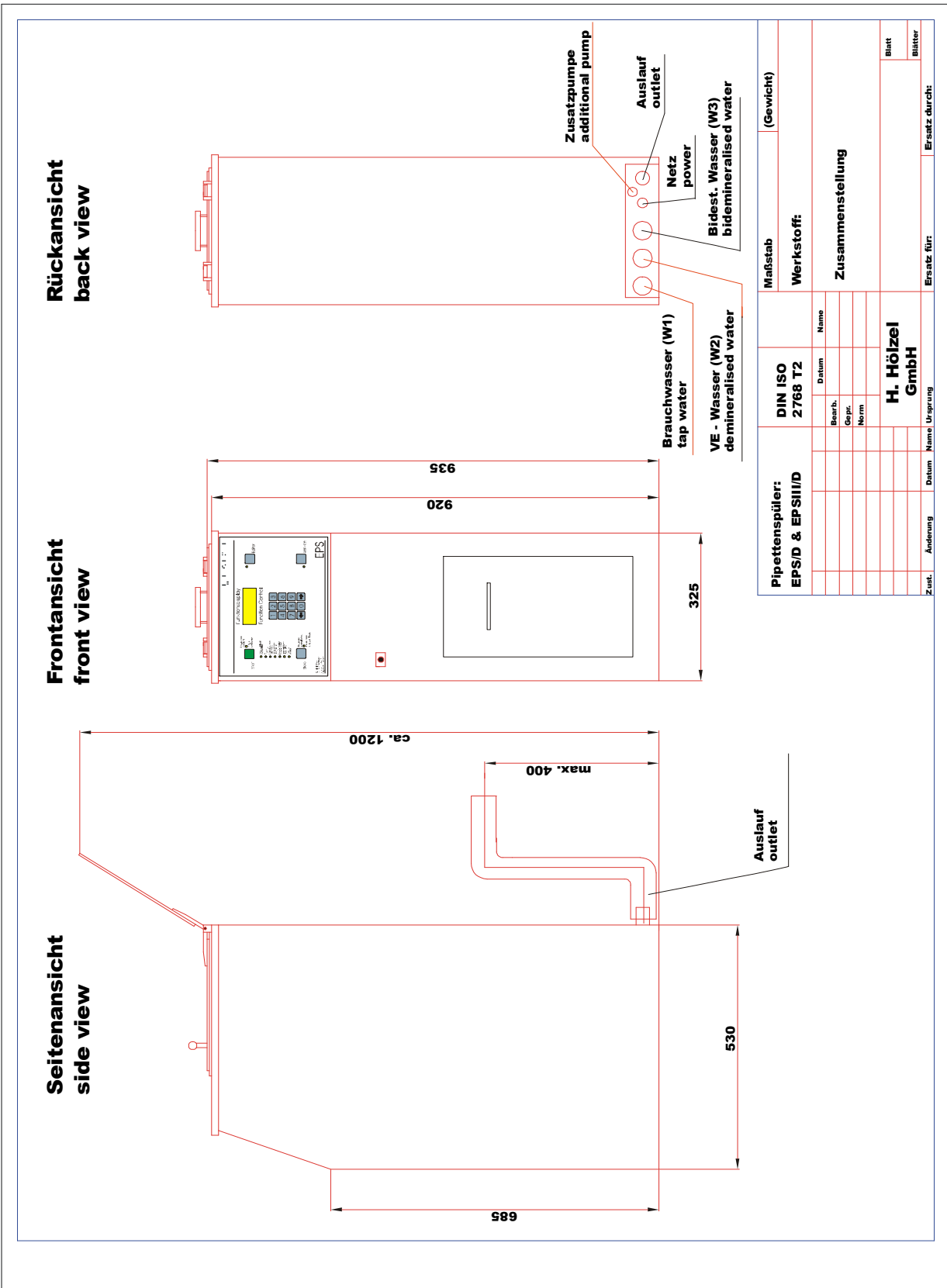
graduated measuring pipettes

volume [ml]	0,1	1,0	2,0	5,0	10,0	25,0	50,0
approx. Ø	6,0	6,4	7,0	8,0	11,0	13,0	15,0
length	250	360	360	360	360	450	500
piece / basket	180	164	149	97	58	38	30
piece / unit	1400	1300	1150	750	450	300	230

full pipettes

volume [ml]	0,5	1,0	2,0	3,0	5,0	10,0	20,0	25,0	100
approx. Ø	4,0	5,0	8,0	9,0	10,0	13,0	18,0	21,0	25,0
length	280	320	330	350	390	450	520	530	580
piece / basket	420	258	105	84	63	39	18	15	7
piece / unit	3000	2000	800	650	500	300	160	130	50

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



Picture 2: schematic drawing of the EPS/D

Stand: 01.07.2023

7.1.2 Variety of the cleaning parameters

Following are the sequence of the different cleaning parameters listed.

Water level	48 or 63 cm
Amount of liquid detergent	0 – 250 ml
Heating temperature	30 – 96°C
Heating time	0 – 120 Min.
Rinsing with tap- or normal household water	0 – 20 changes
Rinsing pauses	0 – 120 Min.
Amount of buffer solution	0 – 200 ml
Neutralise time	0 – 60 Min.
Rinsing with demineralised water	0 – 20 channels
Rinsing pauses	0 – 120 Min.
Rinsing with bi-demineralised water	0 – 10 changes
Rinsing pauses	0 – 120 Min.
Drying temperature	80 – 130°C
Drying time	0 – 240 Min.

The drying time is depending on the amount of pipettes which are dried in the unit !

7.1.3 Cleaning programs

cleaning program No. 1:

(fixed, that means not changeable)

Water level	63 cm
Amount of liquid detergent	50 ml
Heating temperature	87°C
Heating time	12 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	4 changes
Rinsing pauses	30 Min.
Rinsing with demineralised water	2 changes
Rinsing pauses	30 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	116 °C
Drying time	120 Min.

cleaning program No. 2

Water level	48 cm
Amount of liquid detergent	60 ml
Heating temperature	60°C
Heating time	21 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	3 changes
Rinsing pauses	60 Min.
Rinsing with demineralised water	2 changes
Rinsing pauses	15 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	80 °C
Drying time	0 Min.

cleaning program No. 3

Water level	63 cm
Amount of liquid detergent	80 ml
Heating temperature	96°C
Heating time	6 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	1 changes
Rinsing pauses	10 Min.
Rinsing with demineralised water	1 changes
Rinsing pauses	5 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	124 °C
Drying time	90 Min.

cleaning program No. 4

Water level	63 cm
Amount of liquid detergent	70 ml
Heating temperature	60°C
Heating time	10 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	1 changes
Rinsing pauses	5 Min.
Rinsing with demineralised water	1 changes
Rinsing pauses	5 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	120 °C
Drying time	135 Min.

cleaning program No. 5

Water level	48 cm
Amount of liquid detergent	0 ml
Heating temperature	30°C
Heating time	0 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	0 changes
Rinsing pauses	0 Min.
Rinsing with demineralised water	0 changes
Rinsing pauses	0 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	130 °C
Drying time	150 Min.

cleaning program No. 6

Water level	63 cm
Amount of liquid detergent	100 ml
Heating temperature	96°C
Heating time	60 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	5 changes
Rinsing pauses	30 Min.
Rinsing with demineralised water	3 changes
Rinsing pauses	40 Min.
Rinsing with bi-demineralised water	(1) changes
Rinsing pauses	(60) Min.
Drying temperature	130 °C
Drying time	180 Min.

cleaning program No. 7

Water level	63 cm
Amount of liquid detergent	60 ml
Heating temperature	40°C
Heating time	60 Min.
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing with tap- or normal household water	3 changes
Rinsing pauses	40 Min.
Rinsing with demineralised water	1 changes
Rinsing pauses	60 Min.
Rinsing with bi-demineralised water	(1) changes
Rinsing pauses	(60) Min.
Drying temperature	120 °C
Drying time	180 Min.

cleaning program No. 8

Water level	63 cm
Amount of liquid detergent	50 ml
Heating temperature	90°C
Heating time	10 Min.
Rinsing with tap- or normal household water	0 changes
Amount of buffer solution	0 ml
Neutralise time	0 Min.
Rinsing pauses	0 Min.
Rinsing with demineralised water	3 changes
Rinsing pauses	60 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	130 °C
Drying time	150 Min.

cleaning program No. 9

Water level	63 cm
Amount of liquid detergent	50 ml
Heating temperature	90°C
Heating time	20 Min.
Amount of buffer solution	0 (50) ml
Neutralise time	0 (15) Min.
Rinsing with tap- or normal household water	0 (3) changes
Rinsing pauses	0 (30) Min.
Rinsing with demineralised water	2 changes
Rinsing pauses	15 Min.
Rinsing with bi-demineralised water	0 changes
Rinsing pauses	0 Min.
Drying temperature	120 °C
Drying time	180 Min.