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Operating Manual

L2
Automatic Cleaning Machine

CE

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1 Important basic information

1.1 Scope of delivery

L2 – automatic cleaning machine

4 cleaning jars

4 wave breakers

Power cable

Door knob

Operating manual

1.2 Responsibilities

1.2.1 Responsibilities of producer

EG Declaration of conformity

EG-Konformitätserklärung nach Maschinenrichtlinie 2006/42/EG Anhang II 1.A

Der Hersteller / Inverkehrbringer

Helmut Klein GmbH

Fritz-Neuert-Str. 31

75181 Pforzheim

Germany

erklärt hiermit, dass folgendes Produkt

Produktbezeichnung:	Automatische Reinigungsmaschine
Fabrikat:	L2
Seriennummer:	ab 13151xxxxx
Serien-/Typenbezeichnung:	L2
Beschreibung:	automatische Reinigungsmaschine für Uhrwerke, Uhrwerksteile und Kleinteile

allen einschlägigen Bestimmungen der oben genannten Richtlinie sowie den weiteren angewandten Richtlinien (nachfolgend) - einschließlich deren zum Zeitpunkt der Erklärung geltenden Änderungen - entspricht.

Folgende weitere EU-Richtlinien wurden angewandt:

EMV-Richtlinie 2004/108/EG
RoHS-Richtlinie 2011/65/EU

Die Schutzziele der Niederspannungsrichtlinie 2006/95/EG wurden eingehalten.

Folgende harmonisierte Normen wurden angewandt:

EN 1037:1995+A1:2008	Sicherheit von Maschinen - Vermeidung von unerwartetem Anlauf
EN 1093-1:2008	Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen - Teil 1: Auswahl der Prüfverfahren
EN 1093-11:2001+A1:2008	Sicherheit von Maschinen - Bewertung der Emission von luftgetragenen Gefahrstoffen - Teil 11: Reinigungsindex
EN 1127-1:2011	Explosionsfähige Atmosphären - Explosionsschutz - Teil 1: Grundlagen und Methodik
EN 13463-1:2009	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 1: Grundlagen und Anforderungen
EN 13463-5:2011	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 5: Schutz durch konstruktive Sicherheit "c"
EN 13463-6:2005	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 6: Schutz durch Zündquellenüberwachung "b"
EN 13463-8:2003	Nicht-elektrische Geräte für den Einsatz in explosionsgefährdeten Bereichen - Teil 8: Schutz durch Flüssigkeitskapselung "k"
EN 60079-0:2012/A11:2013	Explosionsgefährdete Bereiche - Teil 0: Betriebsmittel - Allgemeine Anforderungen (IEC 60079-0:2011 (modifiziert) + IEC 60079-0:2011/IS1:2013)
EN 60079-26:2007	Explosionsfähige Atmosphäre - Teil 26: Betriebsmittel mit Geräteschutzniveau (EPL) Ga (IEC 60079-26:2006)
EN 60204-1:2006/AC:2010	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen (IEC 60204-1:2005 (modifiziert))
EN ISO 12100:2010	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung (ISO 12100:2010)
EN ISO 13849-1:2008/AC:2009	Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen - Teil 1: Allgemeine Gestaltungsleitsätze (ISO 13849-1:2006)

Zusätzlich gegeben: Sicherheitskonzept in Anlehnung an 94/9/EG ATEX RL

Ort: Pforzheim

Datum: 03.02.2016

1.2.2 Responsibilities of operator

In accordance with the installation and operation conditions, the operator must ensure that the setting-up is installed in a well-ventilated room, preferably in a technically ventilated cabinet.

In case of damage to persons, cleaning machine or cleaning material caused by improper use, contrary to the instructions of these operating manual as well as failure to observe the prescribed maintenance intervals, the producer assumes no liability whatsoever.

The operator is liable for the instruction of the user.

1.3 External interfaces

Exhaust Air Optional connection to an external exhaust / exhaust system

1.4 Legal information

1.4.1 Be sure to observe before commissioning:

Please read these instructions carefully before usage and use this cleaning machine only according to the instructions given here. In addition to the instructions in this manual, please observe the country-specific safety instructions.

1.4.2 Exclusion of liability

In case of damage to persons, cleaning machine or cleaning material caused by improper use, contrary to the instructions of these operating manual as well as failure to observe the prescribed maintenance intervals, the producer assumes no liability whatsoever.

The operator is liable for the instruction of the user.

1.5 Documentation

This manual is part of the scope of delivery. It is to be kept close to the access point and also remains on the machine when the cleaning machine is resold.

We reserve the right to make alterations by means of further technical developments in comparison with the version shown in this manual.

1.5.1 Conventions

Presentation

This manual has three columns. In the left column you will find the chapter numbers. In the second column, you will find signs, danger symbols and signal words. The respective explanation can be found in the third column. Descriptions and explanations are drawn partially through column 2 and 3 for better legibility.

References

	Information on safety data sheets of the manufacturers regarding the cleaning media as well as the professional handling of these are marked with an orange arrow in this manual

Graphic symbols

	This symbol indicates additional information

Abbreviations

HMI	Human Machine Interface. The whole unit used for operating the machine. Display, start/stop button and selection knob.
ST/STP	Start / Stop button to the left of the display. It is used to start, stop and interrupt the cleaning programs and is used to confirm safety functions. In general, all movements of the machine or critical steps must be confirmed with this button.
ENC	Rotating encoder. A rotary knob with confirmation function to the right of the display, which is used to move the cursor and to change the values in the settings and during the program setting as well as to navigate through the menu. By pressing, you can confirm set values, or select buttons in the menu navigation or press.

Technical terms

These technical terms are given in the instructions for explanation, description or illustration of the machine and / or its function.

Jar	The glass vessels for cleaning liquids at position 2-6 as well as the ultrasonic vessel at position 1
Cleaning media	Liquid which is filled into the cleaning vessels for cleaning or rinsing
A-Axis	The rotary table on which the cleaning vessels are arranged (rotary movement)
B-Axis	The linear up and down movement of the spindle or rather its drive (linear movement)
C-Axis	The cleaning spindle on which the cleaning basket is mounted (rotary movement)
Spindle	Drive unit for the cleaning basket in order to move it in the bath
Basket holder	Bayonet mount which is attached to the spindle shaft in order to fix the cleaning basket on the shaft
Basket cage	Also basket rack. Insert in which the basket inserts are stacked in order to be attached to the basket holder
Cleaning basket	Unit consisting of basket inserts and basket cage
Basket inserts	Various inserts which serve to taking up cleaning material and are stacked in the movement holder

1.6 International service address

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2 Safety

2.1 Convention for safety instructions

2.1.1 Signal words

DANGER	DANGER indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
WARNING	WARNING warns of a possible safety risk or serious injuries.
ATTENTION	ATTENTION warns of a possible risk of minor or moderate injuries.

2.1.2 Signs in the manual or on the machine

	This symbol warns of the dangers of electric voltage
	This symbol warns of the risk of injury from fire-hazardous substances
	This symbol warns that an explosive atmosphere may occur in the indicated area
	This symbol draws attention to a possible hazard due to heat or hot instrument parts.
	This symbol generally warns of a possible danger of injury.
	**This symbol indicates additional information**
	This symbol warns about danger of injury and possible damage to property

2.2 Proper use of the machine

The L2 cleaning machine is intended for the cleaning of disassembled and assembled movements, movement parts as well as mechanical parts by means of aqueous and solvent-based cleaning and rinsing media.

When used as intended, flammable liquids can be used as cleaning and rinsing media.

2.2.1 Field of application

It is prohibited to operate the machine in an environment with an explosive atmosphere of flammable/explosive gases, vapors or dusts.

2.2.2 Requirements for the staff

Operating of the machine only by trained personnel, in accordance with these operating instructions.

2.2.3 Safety-relevant environmental conditions

Temperature range:	min. 5°C max. 30°C
Relative humidity (%):	max. 85%
Pollution:	The surrounding air must be dust-free, especially free of metallic polishing dust

Operation in an explosive atmosphere is not permitted!

2.2.4 Safety-relevant references

Assembly / Setting up

Setup conditions The machine must be placed on a dry and well-ventilated space for the discharge of the cleaning and rinsing media from the area of the cleaning vessels filled with these media. A direct connection to a technical ventilation or installation in a technically ventilated extraction cabinet is recommended by the manufacturer.

Connection conditions For safety reasons, the machine may only be connected to a properly earthed socket. The technical specifications of the type plate must be in accordance with the existing connection conditions, in particular voltage and current. The presence of a properly functioning protective earth must be checked before connection by a qualified electrician.

Lifting / Carrying Due to the weight, the machine should be moved by at least 2 persons.

Check for damage Before commissioning, check for damage of machine and power cable. No commissioning in case of recognizable damage.

Avoidance of electrical accidents Keep the setup surface, housing and control elements dry. Protect from penetrating moisture! In case of filling, maintenance and care of the machine, suspicion of penetrating liquid, malfunctions as well as after using pull mains plug. Open the machine only by electricians.

Operation

Supply air / Exhaust air

The ventilation and ventilation openings (rear side of the machine and top) must be checked of access to the filters and sufficient airflow before commissioning. Contaminated filters must be exchanged and provided for a sufficient distance to ensure an unobstructed airflow.

Media (cleaning- / rinsing-liquids)

Only permitted media may be used in this machine! Observe the information in chapter 13.

Fire- and explosion-hazard

In case of improper operation (without adequate ventilation of the environment) as well as when changing the cleaning and rinsing media, ignitable solvent vapours can escape.
Smoking and open sources of ignition in the machinery environment, especially in the direct vicinity of the zone marked with the corresponding danger symbol, are prohibited.
Be sure to observe the safety instructions described in this manual to avoid such dangers.
If liquid is discharged from the cleaning machine (quantity > drop), it must not be operated further for safety reasons.
In the vicinity of the cleaning machine, the maximum daily requirement for solvents used must be stored at a minimum distance to the cleaning machine of > 3m.

Hot surfaces

Depending on the operating time of the cleaning machine, surfaces, in particular the air outlet of the heating system, can become hot (max. approx. 65 ° C).

2.3 Consideration of operation manual

This manual is part of the scope of delivery. It is to be kept close to the access point and also remains on the machine when the cleaning machine is resold.

We reserve the right to make alterations by means of further technical developments in comparison with the version shown in this manual.

Be sure to observe before commissioning

Please read these instructions carefully before usage and use this cleaning machine only according to the instructions given here. In addition to the instructions in this manual, please observe the country-specific safety instructions.

2.4 Signs on the machine

	CAUTION - Hot surface Affixing: Inside the machine next to the air outlet of the heater
	CAUTION – Explosive atmosphere Affixing: Inside the machine
	CAUTION – fast rotating objects Affixing: Inside the machine
	Avoid ignition sources Affixing: Front and rear machine
	DANGER – flammable liquids Affixing: Front machine

2.5 Residual risks and protective measures

When handling flammable media, there is a risk that they may be spilled, drips may remain outside the designated jars, or the operator may come into contact with them.

Observe the applicable safety regulations when handling flammable solvents according to the safety data sheets of the media used. The safety data sheets must be stored within easy reach in order to have access to this information at all times.

Avoid any risk of ignition within 3 m of the machine. This applies, in particular, to static charges, smoke, open flames of all kinds, as well as brush-mounted motors on other devices (e.g. polishing machines,).

Before operating the machine, touch an earthed part (e.g. the machine housing, a faucet or radiator) to dissipate electrical charges. Wear an ESD bracelet if necessary.

Ensure there is sufficient air exchange in the installation room.

	Fire and explosion hazard! Observe the applicable safety regulations when handling flammable solvents according to the safety data sheets of the media used.
	Keep away from all sources of ignition! Avoid sparking by electrostatic discharge! Unload possible electrostatic charges (body charge) before handling combustible media by touching an earthed device (e.g. machine housing, faucet, radiator or use ESD protective devices (ESD bracelet)).
	If fluid leaks when the media container is replaced, it must be removed with a dry cloth (to avoid electrostatic charging).

3 Technical data

Mechanics	
Machine outer dimensions width/depth/height (ca. mm)	400 x 370 x 550
Weight (ca. kg)	36
Number of vessels (Stk.)	4
Volume per vessel (L)	0,8
Exhaust air connection (optional)	DN 80

Electronics	
Voltage variant (VAC / Hz)	230 / 50/60
Voltage variant (VAC / Hz)	110 / 50/60
Power consumption total max. (W)	500
Power consumption in standby (W)	12
Speed range mode spin in 7 stepsadjustable up to max. (RPM)	0 – 200 – 400 – 600 – 800 - 1000 – 1200 – 1400
Rotation speed range mode clean/rinse (max rpm)	0 - 400
Speed oscillation	0 - 500
Operating sound pressure level (LpAU)	< 60 dB

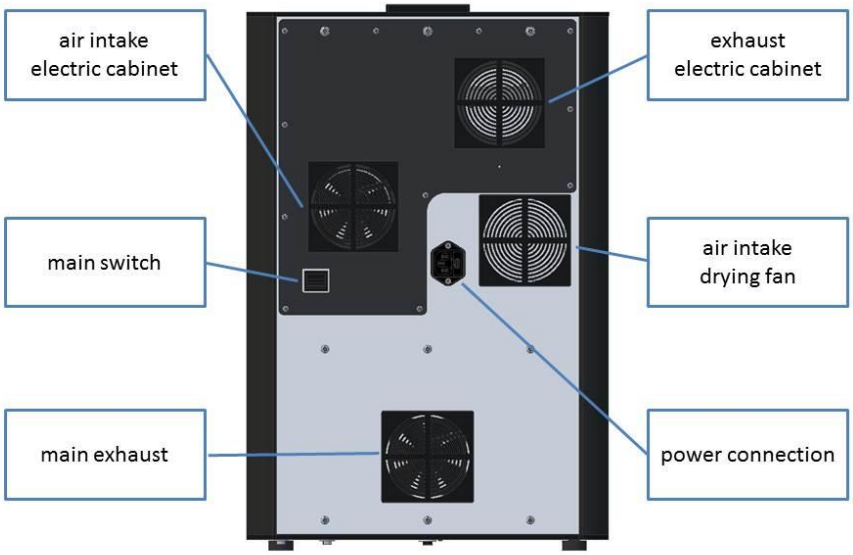
[1] Measured maximum sound pressure level at a distance of 1 m

Equipment	
Single basket outer dimensions D (ca. mm)	64
Loading cleaning basket (total) - max. (ca. g)	600

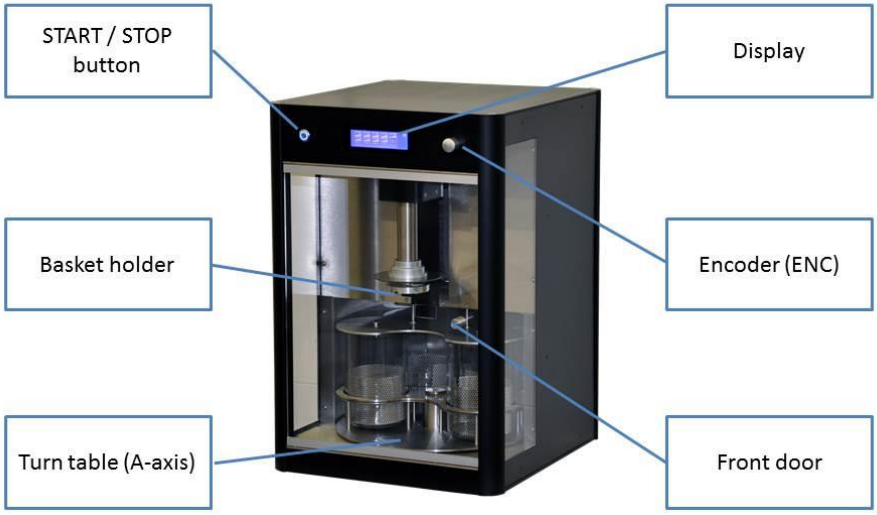
4 Construction and function

4.1 Construction

4.1.1 Description of the machine



The mains supply is via a cold-plug socket. Each machine is supplied with a corresponding power cable.
The fuse holders are equipped with 2 glass tube fuses 5 x 20 mm - 6,3A slow-blow.



4.2 Functional description

The automatic cleaning machine L2 is equipped with 4 cleaning vessels.

The material to be cleaned is placed in the cleaning basket and then automatically moved by the machine through the 4 cleaning vessels with the appropriate cleaning and rinsing media. In each bath, an adjustable cleaning movement fixed by the user can be performed.

The cleaning basket is then thrown at an adjustable speed and transported to the next cleaning vessel.

When finished, the cleaning basket is dried by air flow (cold / warm / hot).

4.3 Process description

The cleaning is carried out by means of aqueous or solvent-based cleaning and rinsing media with the flow generated in the cleaning vessel by movement of the product to be cleaned. The process is carried out at normal pressure (ambient pressure).

Drying is carried out by evaporation of the last used medium in the air stream at normal pressure and air flow temperature to max. 60 ° C.

5 Delivery, internal transport, unpacking

5.1 Safety

	Lifting aids and transport equipment. Please note that the machine weight will lead to crushing hazards if the machine is not properly lifted / transported.
	Ensure that condensation can form in the packaging and machine when delivered at low temperatures (below 8 ° C). There is a risk of electric shock due to condensing moisture. Leave the machine to ambient temperature for at least 24 hours after delivery.

5.2 Delivery

Ensure that the route from the delivery point to the set-up site is free of obstacles and can be travelled with a suitable conveyor (lifting truck, hand truck).

5.3 Internal transport

Due to the weight, the machine should be moved by at least 2 people.

5.4 Unpacking

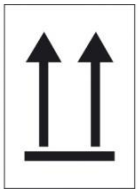
The packaging consists of a cardboard box, as well as an inner packaging made of foam material and space material made of cardboard boards. Keep the packaging for service purposes.

Any disposal must be carried out in accordance with the applicable disposal guidelines. You can also return the packaging to the manufacturer or supplier.

5.5 Unpacking

The machine is delivered on a pallet in a transport carton with foam material.

Open the box on the side where this sticker is located:



Remove the two foam material parts next to the box with the accessories.

Remove the device including the foam material parts from the box.

Caution, the unit has a net weight of 41 kg.

Remove the remaining 2 side parts and it can lift off from the bottom foam material part.

Remove the protective cover and place the appliance on a solid surface. (Final position)

6 Setup conditions

6.1 Safety

Attention! Danger of explosion / deflagration in the area of the ventilation openings of the cleaning machine!

Observe the applicable safety regulations when handling flammable media!

Keep all ignition sources away from the danger area!

Avoid sparking by electrostatic discharge!

6.2 Setup plan

6.3 Total space requirement

The machine needs a setup surface of 400 mm x 370 mm.

There should be at least 150 mm distance from the wall or to other objects at the side and at the rear in order to ensure adequate air supply.

At least 500 mm are required to open the door.

Attention! For safety reasons, no objects should be stored in the opening area of the door. Accessibility of the machine from the front must always be ensured.

6.4 Dimensions and weights

Dimensions: 400 x 370 x 550 mm

Weight: 36 kg

6.5 Foundation and floor

Due to the weight of the machine, the floor and substructure (base cabinet, table, etc.) must have sufficient strength.

Due to possible leaks, care must be taken that the table and floor cover is wipe able and moisture-proof.

6.6 Environmental conditions

Ensure adequate ventilation at the machine's location.

The following prerequisites must be observed for safe operation of the cleaning machine:

- Permissible ambient temperature during operation: + 10 ° C + 30 ° C
- Permissible relative humidity during operation: max. 80 %
- Operation is only permitted in well-ventilated rooms. The use of a technical ventilation or extraction cabinet is recommended, provided the machine is not connected to an external extraction system.
- The environment must not be dusty

	Fire and explosion hazard! Incorrect fumes of the cleaning and rinsing media can escape if the equipment is not used properly, in the case of malfunction or when changing the cleaning liquid.
	Smoking and open sources of ignition are prohibited in the vicinity of the cleaning machine! In the vicinity of the cleaning machine, the maximum daily requirement for solvents used must be stored at a minimum distance to the cleaning machine of > 3 m.
	The storage has to be carried out according to TRBS!

6.7 Supply connections

The machine requires a 230V AC power supply (L / NPE) with a working protective end. This is to be tested before connection by an electrician.

	It is essential to ensure that the earthling is correct. Before connecting to the power supply, this must be checked by a qualified electrician.

6.8 Precautions provided by the customer

Place the cleaning machine on a stable, level, dry surface, which is resistant to the cleaning fluid. The floor should be smooth, media resistant and wipe able.

Ensure adequate ventilation of the room.

7 Assembly and installation, initial commissioning

7.1 Safety

Be sure to read this chapter completely before initial commissioning and observe the safety instructions of the relevant sub-items.

7.2 Assembly and installation

Connecting to the power supply

Net conditions:

The connection conditions must correspond to the specifications on the type plate.

	In order to avoid static charging, it is essential to ensure that the earthling is correct. Before connecting to the power supply, this must be checked by a qualified electrician.

Power supply:

Connect the power cable to the machine and connect it to an earned shockproof socket.

	The socket must be accessible at all times, as the mains plug is a separation device.

7.3 Initial commissioning

7.3.1 Start main switch:

Switch on the machine at the main switch (Fig. 4.1.1).

The machine starts the internal check of all functions and safety functions.

The exhaust ventilator starts and after 6 seconds of safety time, the machine asks you to confirm the start of the initialization by pressing the [START / STOP] key.

Once the axes have been initialized, the machine is ready for operation.

7.3.2 Choose language:

Move the cursor to the arrow button → and confirm by pressing the encoder to enter the main menu. Select the sub-item settings, where you can select the language.

7.3.3 Loading of the jars

If the jars are already in the machine at delivery, follow the instructions below to remove the empty jars from the machine.

Preparation of the jars

Due to the manufacturing process, dust or dirt may be present in the jars. Before first use the jars should be rinsed quickly in order to avoid foreign objects in the cleaning media.

Insert the wave breakers into the jars

To prevent the liquid from vibrating during operation, the jars must be fitted with wave breakers.

Bend the stainless steel stretchers in a circle (not too tight) so that they are applied with a little tension inside the jar. Please ensure that the cleaning basket can rotate freely with a sufficient distance. The wave breakers should be placed completely against the jars. They serve to prevent rotation of the liquid.

 	Caution! Danger of cutting. The wave breakers are very thin-walled stainless steel grids, which can have sharp edges due to the production. Insert with caution and wear appropriate protective gloves.

7.3.4 Fill

Use only permissible cleaning / rinsing media

For safety reasons as well as to avoid machine damage, only authorized materials may be used.

Observe the notes on the recommended media and operating materials as well as restrictions on operating materials.

	Fire and explosion hazard! Observe the applicable safety regulations when handling flammable solvents according to the safety data sheets of the media used.
	Keep away from all sources of ignition! Avoid sparking by electrostatic discharge! Unload possible electrostatic charges (body charge) before handling combustible media by touching an earthed device (e.g. machine housing, faucet, radiator or use ESD protective devices (ESD bracelet)).
	If fluid leaks when the media container is replaced, it must be removed with a dry cloth (to avoid electrostatic charging).

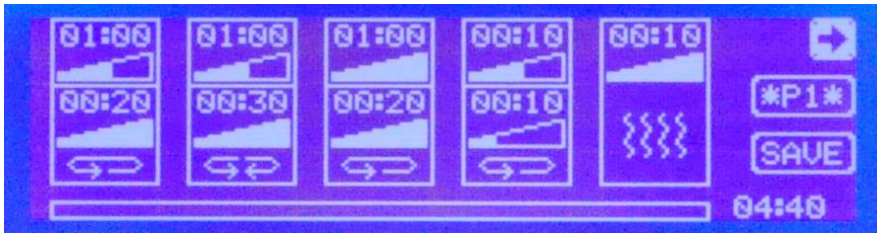
Fill the glasses with the desired liquids. **Filling capacity: 3.5 dl**

	In order to ensure proper operation of the cleaning machine and in order to achieve an optimum cleaning result, the filling level of the operating material must always be between the filling level markings. A too low fill level causes unsatisfactory cleaning results and can cause damage to the cleaning material due to the mechanical friction on the cleaning baskets. Overfilling (beyond the max mark) can cause liquid to spin up during spinning, impede the spinning process and cause media drag.

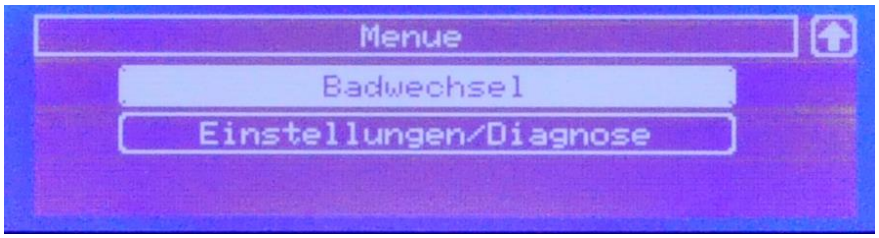
7.3.5 Install and remove the glass jars

To install or remove the glass jars, the cleaning machine offers a function to bring the selected jar to the front position, so they can be removed or installed easily.

Move to the main menu by using the [**->**] button top right



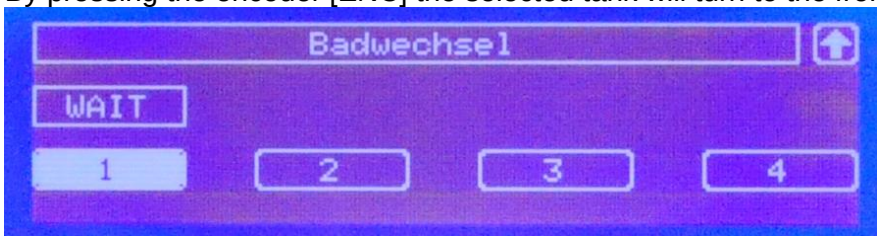
In the main menue, please select [Options] and confirm by pressing the encoder [ENC]



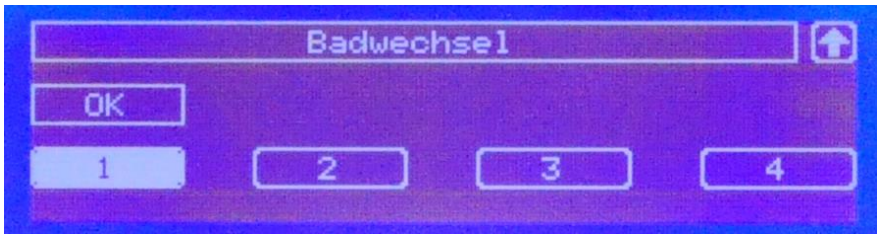
In the „Change Tanks“ menu, you can select the corresponding tank you want to change.

The numbers are the corresponding positions on the turning table counter clockwise

By pressing the encoder [ENC] the selected tank will turn to the front

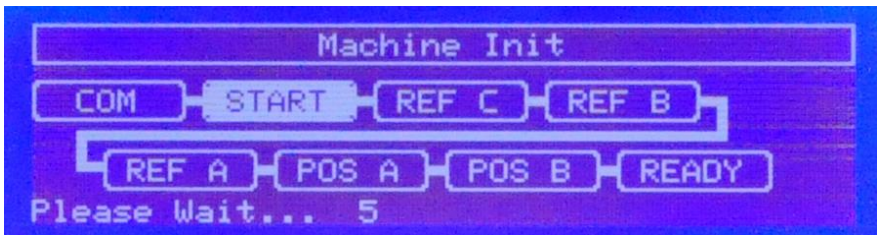


When the front position is achieved, and the cover of the jars is closed again, you can open the door and install/remove the tank.



Please note that the door must be closed for security reasons while the machine is moving.

After changing you can go back with the arrow top right. The machine will not start the initialization again, to make sure all positions are still correct. Please confirm it with the [STRAT] button.



Fire and explosion hazard!

When the jars are inserted, the formation of flammable vapours can occur in the area of the glass openings.

When handling flammable solvents, observe the relevant safety regulations according to the safety data sheet of the respective solvent!

Keep away from all sources of ignition!

Avoid sparking by electrostatic discharge! Unload possible electrostatic charges (body charge) before handling combustible media by touching an earthed device: e.g. machine housing, faucet, radiator or use ESD protective devices (ESD bracelet).

If fluid leaks when the media container is replaced, it must be removed with a dry cloth (to avoid electrostatic charging).

If large quantities of spills, tipping or glass breakage occur, the machine must be stopped immediately (main switch) in order to disconnect the mains connection from the mains plug.

Ensure that there is adequate ventilation.

The service is to be contacted.

The machine must be put back into operation after the solvents have completely dried.

8 Operation

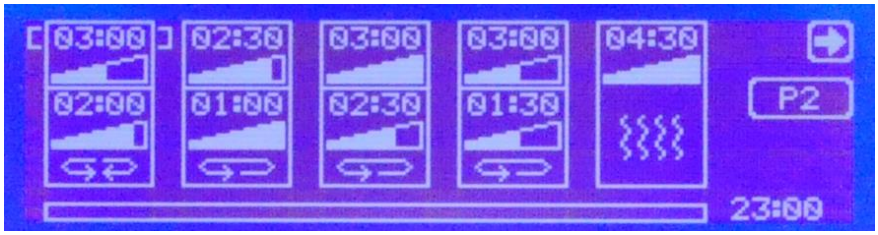
8.1 Safety

Be sure to read this chapter completely before initial commissioning and observe the safety instructions of the relevant sub-items.

8.2 Operating elements

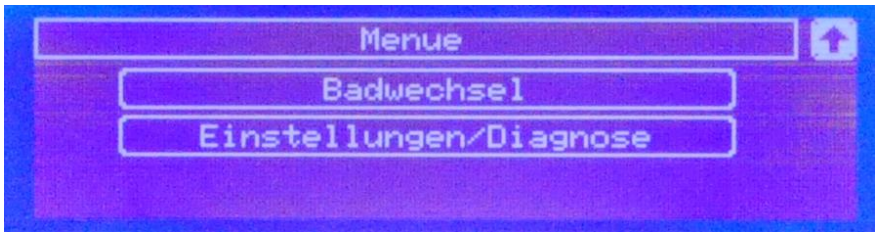
8.3 Display

8.3.1 Program display in automatic mode



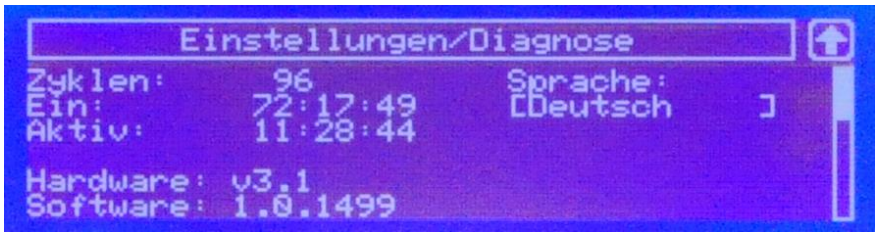
Overview of the loaded program

8.3.2 Menu



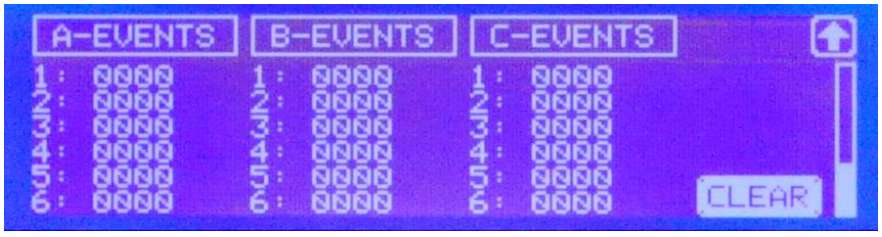
Menu selection

8.3.3 Settings/Diagnose



Operating hours counter and language setting

Diagnose screen for the motor drivers



Error memory of the motor drivers

8.4 Operating modes

9.1.1 Program m ode (automatic mode)

9.1.2 Bath change mode

8.5 Special tools, operating media, material

No tools are required for normal operation. If, during normal operation, it is necessary to change between two basket holder sizes, a stocked screw size of 2.0 mm is required.

Cleaning media must be used as required, considering the manufacturing requirements and / or exclusions.

8.6 Commissioning for daily operation

Turn on main switch

Turn on the cleaning machine on the main switch.

The machine starts the test and initialization program.

Confirm the initialization of the axes by pressing the START / STOP button.

After the initialization has been completed, the machine is ready for operation.

Visual check of the filling levels of the jars

Check the filling level of the cleaning jars.

If necessary, refill liquids. Proceed as described in chapter 9.8 below.

8.7 Loading with cleaning material

Load cleaning basket and insert

The machine can be operated with cleaning baskets of size 64 mm and 80 mm.
A corresponding basket holder is mounted on the shaft of the spindle (C-Axis).

Remove cleaning basket

Open the front door of the machine and grap with two fingers on top of the basket holder to secure it against twisting.

Use the second hand to grap the basket cage with the basket inserts, and press it slightly upwards. Now rotate the basket to release it from the bayonet lock and remove it from the bottom.

Insert cleaning basket

After the usual loading of the individual basket inserts, open the door to the cleaning machine again and fix the basket holder on the shaft again with one hand. Press the cleaning basket slightly upwards and allow it to engage with a slight twist.

	Check the correct position of the cleaning basket on the basket holder to prevent it from being released during operation.

8.8 Filling and changing of the cleaning liquids

To change the cleaning liquids after consumption, proceed as follows:

Use only approved cleaning / rinsing media

For safety reasons as well as to avoid machine damage, only approved materials may be used.

Observe the notes on the recommended media and operating materials as well as restrictions on operating materials.

	Fire and explosion hazard! Observe the applicable safety regulations when handling flammable solvents according to the safety data sheets of the media used.
	Keep away from all sources of ignition! Avoid sparking by electrostatic discharge! Unload possible electrostatic charges (body charge) before handling combustible media by touching an earthed device (e.g. machine housing, faucet, radiator or use ESD protective devices (ESD bracelet)).
	If fluid leaks when the media container is replaced, it must be removed with a dry cloth (to avoid electrostatic charging).

Fill the jars with the desired liquids until they are marked.

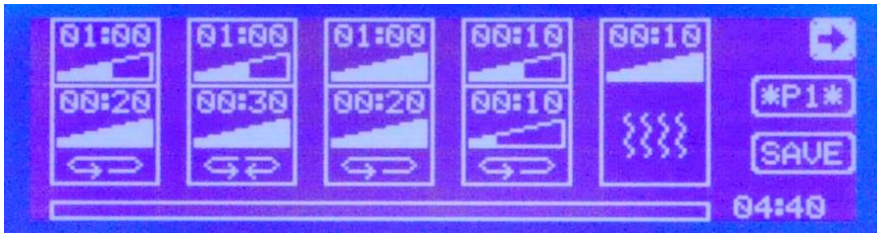
	In order to ensure proper operation of the cleaning machine and to achieve an optimum cleaning result, the filling level of the equipment must always be +/- 5 mm around the filling level mark. A too low filling level causes unsatisfactory cleaning results and can cause damage to the cleaning material due to the mechanical friction on the cleaning baskets. Overfilling (beyond the max mark) can cause liquid to spin up during spinning, impede the spinning process and cause media drag.

8.8.1 Remove and insert the jars into the machine

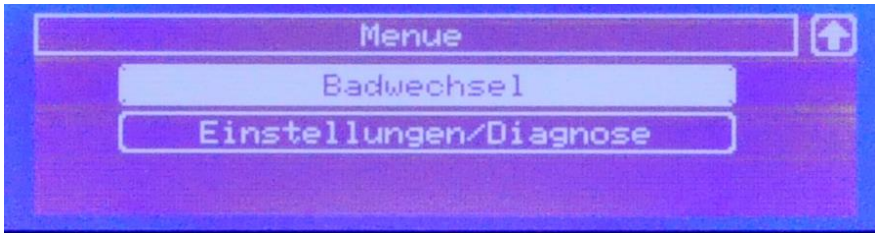
To remove and insert the jars, the cleaning machine offers the function of individually selecting the jars and moving them forward, in order to remove or insert them.

To do this, proceed as follows:

First, change to the main menu with the arrow key if you are not in the main menu:



In the main menu, select the item "Bath change" and confirm the selection by pressing the Encoder [ENC]:

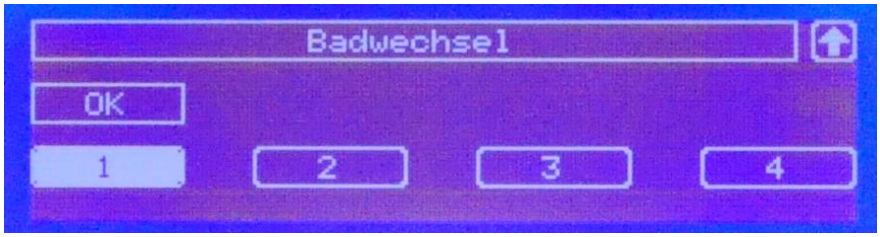


You are now in the bath change menu.

Turn the ENC until the desired position is selected, in which you want to insert your filled cleaning jar. The bath position indicates the position of the individual gear on the turntable and is counter-clockwise.

Press the encoder [ENC] - the bath is then moved forward.

After the bath is at the front and the bath cover has been closed again, you can open the door and remove the bath.



Please note that, for safety reasons, the door must be closed for all movements of the machine. If this is not the case, the machine requests for closing the door.

If all baths are inserted or changed, you can leave the bath change menu again by clicking on the arrow in the upper right corner. For safety reasons, an initialization of the turntable is requested again, which is started with the Start button.

	Fire and explosion hazard! When the jars are inserted, the formation of flammable vapours can occur in the area of the jar openings. When handling flammable solvents, observe the relevant safety regulations according to the safety data sheet of the respective solvent! Keep away from all sources of ignition!
	Avoid sparking by electrostatic discharge! Unload possible electrostatic charges (body charge) before handling combustible media by touching an earthed device, e.g. machine housing, faucet, and radiator or use ESD protective devices (ESD bracelet). If liquid leaks when the media container is replaced, it must be removed with a dry cloth (to avoid electrostatic charging). If large amounts of spills, tipping or glass breakage occur, immediately shut down the machine (main switch) to disconnect the power cable from the mains plug.
	Ensure that there is adequate ventilation. The service is to be contacted. The machine must be put back into service after the solvents have completely dried.

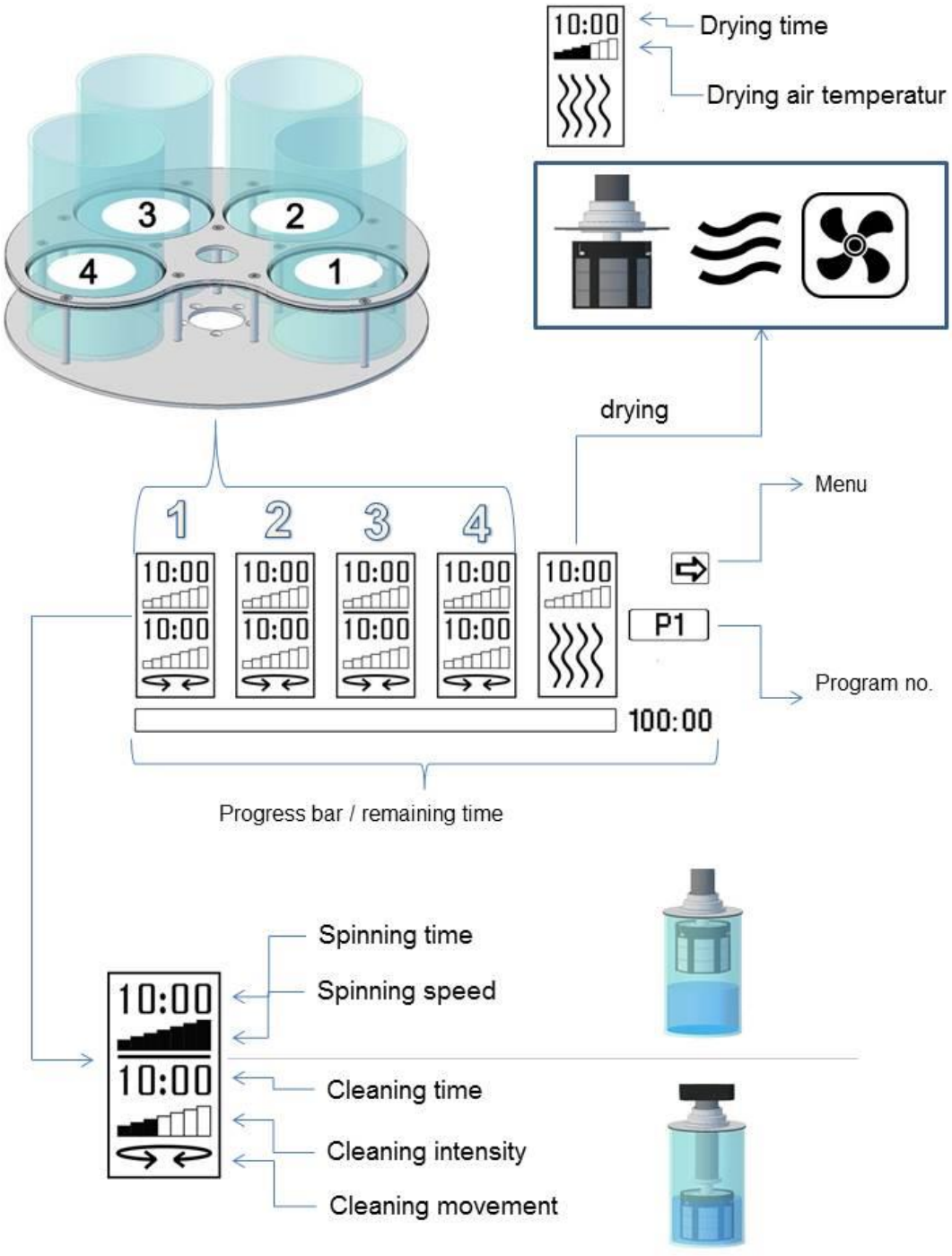
8.9 Operation mode

After the machine is equipped with jars and cleaning liquid, you can now start the actual cleaning cycles

8.10 Setting and adjusting the cleaning programs

The machine displays all the relevant settings for the whole active cleaning cycle on the display. All parameters can also be adjusted while operation (not the step which is active)

Please check the following graphic for explanation of the single symbols


10:00
Drying time
Drying air temperatur
3
2
4
1
drying
1
2
3
4
10:00
Menu
P1
Program no.
100:00
Progress bar / remaining time
Spinning time
Spinning speed
Cleaning time
Cleaning intensity
Cleaning movement

Drying:

	Fire and explosion hazard! While drying, the remaining residual solvent in the basket is evaporated with hot air. The solvent vapours are transported out of the machine interior by the exhaust air. The machine must be connected to an external exhaust air, in a technically ventilated extraction cabinet or in a very well ventilated room. Keep away from all sources of ignition!
 	
	The outlet of the heating ventilator is still hot (< 60 ° C) inside and the cleaning basket is still warm (<4 5 ° C) depending on the program. If necessary, allow the cleaning basket to cool for a while or use gloves to remove the cleaning basket immediately. Be careful not to come into contact with the air outlet.

As the single cleaning steps, also drying is displayed as a step and can be adjusted in time and temperature (e steps: cold / warm / hot)

cold:	only fan
warm:	35°C
hot:	55°C

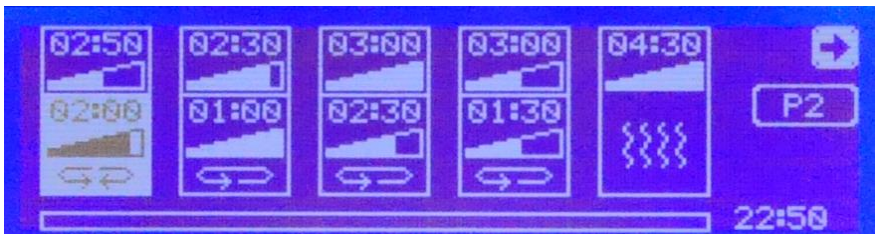
The temperatures can be adjusted by the service technician upon request.

You can adjust the drying time. Please note that it takes around 20 seconds to reach the temperature. Also after finishing the fan continues to cool down the heater again.

After finishing you adjustments to the program, please select the [->] again, to save it

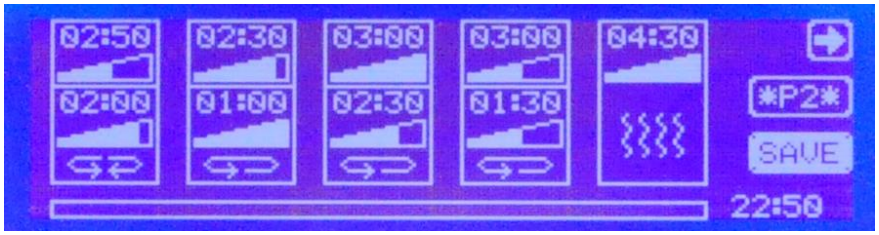
8.11 Saving the cleaning programs:

The machine can save 2 cleaning programs (P1 and P2). On the right side of the display you see the active program.

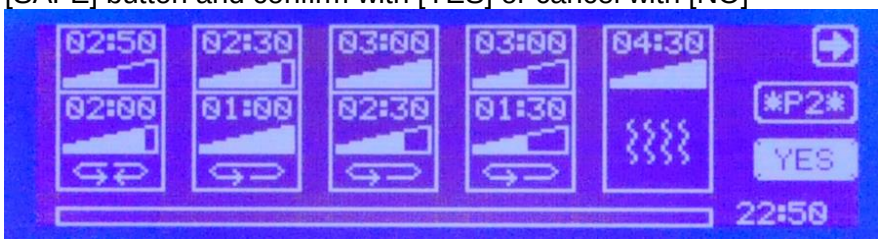


If you change the active program while operation or in standby, the changes will be saved temporary until the machine is switched off. If you want to safe your changes permanent to one of your programs, please select the [SAFE] button and confirm with [YES]

If a saved program is changed while operation or standby, but not saved yet, it will be symbolized with stars next to the program number [*P1*]



If you want to safe your changes permanent to one of your programs, please select the [SAFE] button and confirm with [YES] or cancel with [NO]



To select the other program, for operation, go to the program number, press the encoder, select the program by turning the encoder and confirm by oppressing it again.

Pause or abort a cleaning program

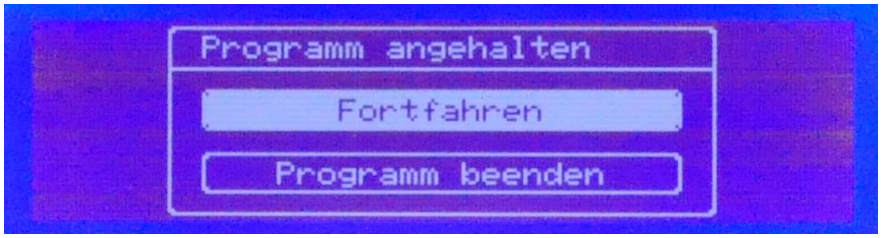
Caution! Danger of injury due to fast rotating cleaning basket!

Never open the cleaning machine door during the cleaning process! When the door is opened, the machine automatically stops the cleaning program.

Never reach into the rotating cleaning basket!

If necessary, interrupt the cleaning program in a controlled manner, or pause it.

To pause or abort a cleaning program, press the [START/STOP] button. The following message will show up, where you can select how to proceed.



When „Programm beenden“ is selected, the basket will be spanned before ending the program, if it was already in the liquid. After spinning the machine goes back the end/start position, If you do not want the basket to spin off, press the [START/STOP] button again and select „prgramm abbrechen“ a second time, so also the spinning will be aborted.

If you just wanted to pause the program, select “fortfahren” and the machine will proceed where it hast paused.

8.12 Adjust the cleaning movements

An adjustment of the cleaning movements beyond the 7 steps, which can be determined by the operator via the program, is only possible by the service technician. Please contact our service, if you want an adjustment / change (acceleration, rotation angle, velocity amplitude of the oscillation)

8.13 Inspection and maintenance

Daily:

- Check filling levels of the cleaning media

Weekly:

- Clean cleaning spindle

Monthly

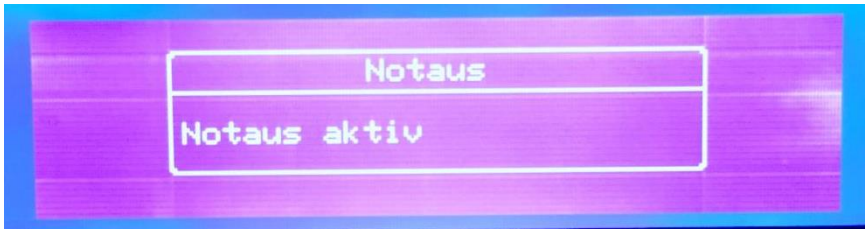
- Check the filter of the exhaust air and the supply air

Annual:

- Check the grease on the spindle (B-Axis)

8.14 Recommissioning after an emergency stop

When the emergency-stop button is pressed, the machine instantly stops all movements, the heating element is deactivated and all ventilators are activated for safety reasons to prevent the formation of an explosive atmosphere.



When the emergency-stop button is reset, the machine requests a new initialization which has to be confirmed by the [START / STOP] button after the safety time.

8.15 Recommissioning after a longer standstill

After a longer standstill (> 1 week), it is recommended to raise the bath cover manually and check whether any evaporating cleaning media have stacked the seals to the jars. Some liquids tend to form a sticky deposit upon aging.

8.16 Decommissioning

	Fire and explosion hazard! If residual liquids remain in the machine, inflammation can occur.
	Ensure that there are no more liquids in the machine after the machine has been put out of operation. Ensure that there is adequate ventilation.
	Keep away from all sources of ignition!

To shut down the machine systematically, first remove all cleaning jars as described in chapter 9.8 and add the liquids to the controlled disposal. Clean the jars and then reinsert them into the machine.

Alternatively, you can shut down the machine even without cleaning jars.

First, turn off the main switch and then disconnect the machine from the power supply by unplugging the power cable from the wall outlet.

Ensure that no residues remain in the machine at any time.

9 Error search

9.1 Safety

	For safety reasons, repairs may only be carried out by a service centre authorized by the manufacturer. The manufacturer accepts no liability for damage caused by unauthorized or improper intervention on the cleaning machine.

9.2 Service address

Greiner Vibrograf AG
Mittelstrasse 2
4900 Langenthal
Switzerland
info@greinervibrograf.ch

9.3 Position and marking of fuses

The machine is equipped with several fuses. The main fuse, which is to be changed by the user, is located on the cold-plug connection. On the back (See figure in 4.1.1)

2 pieces. Fuses T6, 3 A (glass tube fuse 5x20mm).

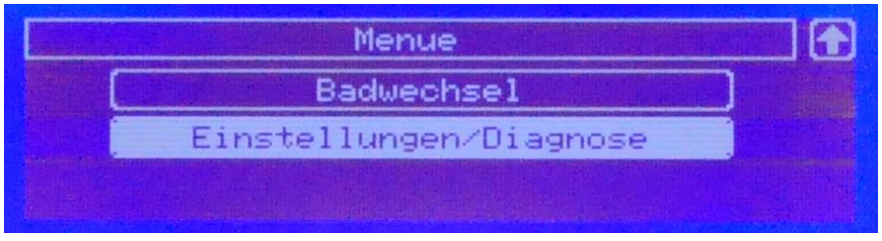
All other fuses are located directly in the control cabinet and can only be changed by electricians or the service.

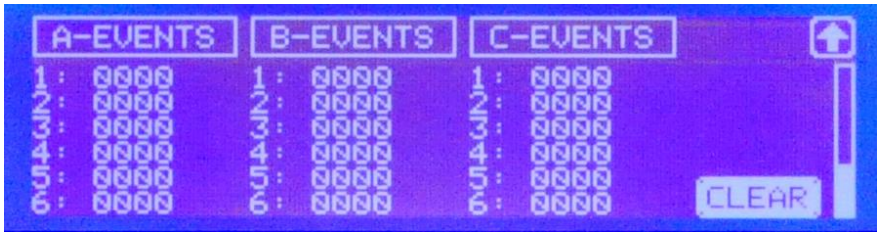
The description can be found in the service manual.

9.4 Error condition detection

Malfunctions of the cleaning machine are indicated in the diagnostics menu. Here, you can see the operating state of the individual axes, as well as the error codes, in order to transmit these to the service in case of an error.

In the diagnostics menu, you will be taken from the main menu in the submenu "Settings / Diagnosis" on pages 2-3.





A list of the possible errors without error messages as well as the regarding procedures for error condition detection can be found in chap. 10.5.

Any possible errors with error messages which have to be remedied by the service are listed in chap. 10.6.

If an error cannot be remedied with the measures specified in the fault rectification, please contact the supplier or manufacturer immediately.

9.5 First measures for fault rectification

Fault / Error message	Possible cause(s)	Remedy
When the main switch is turned on, the display light remains off. No operating noise is heard.	Defect of main fuse.	Change the main fuse at the mains connection 2 pcs. T6,3 A (5 x 20 mm) Turn off and restart the machine: If the problem persists, contact the service.

9.6 Faults with error message in the diagnostics menu – measures for fault rectification

Fault / Error message	Possible cause(s)	Remedy
„CRC Error“– is displayed when switching on.	Plausibility check (checksum) of the machine parameters since the last shutdown failed.	Contact service → Reset to factory settings in the service menu.

Displays in diagnostic screen 1:

A/B/C-Axis offline	CAN connection to motor driver interrupted	Contact service
	Motor driver defective	Contact service

Displays in diagnostic screen 2:

A/B/C-EVENT - xxxxxx	Error messages of motor driver	Contact service and keep error code ready.

9.7 Repairs

 **DANGER**	For safety reasons, repairs may only be carried out by a service centre authorized by the manufacturer. The manufacturer accepts no liability for damage caused by unauthorized or improper intervention on the cleaning machine.

Open only by authorized qualified electricians

 **DANGER**	Risk of electric shock due to parts that lead to the mains voltage inside the cleaning machine! Always unplug the mains plug before opening the cleaning machine! The manufacturer accepts no liability for damage caused by unauthorized intervention on the cleaning machine.
 **CAUTION**	Danger of injury due to sharp edges in the cleaning machine as well as moving / rotating components
 **CAUTION**	Risk of injury from hot surfaces! The drives and the heater can still be hot immediately after operation of the cleaning machines.

In the case of malfunctions of the cleaning machine, which cannot be remedied by the instructions for fault rectification in this manual, please contact the supplier or manufacturer.

If a return to a service centre is required:

- Use the original packaging to avoid transport damage.
- Provide a description of the fault/error as detailed as possible.

10 Maintenance

10.1 Safety

During all maintenance and cleaning work on the machine, make sure that the machine is disconnected from the mains.

 **DANGER**	Risk of electric shock due to parts that lead to the mains voltage inside the cleaning machine! Always unplug the mains plug before opening the cleaning machine! The manufacturer accepts no liability for damage caused by unauthorized intervention on the cleaning machine.

10.2 Service address

Greiner Vibrograf AG
Mittelstrasse 2
4900 Langenthal
Switzerland

10.3 Maintenance protocol

The machine does not require a maintenance protocol.

10.4 Control procedures and test devices

No special test equipment is needed for the maintenance measures of the user. The inspection is carried out on a visual or manual basis.

10.5 Special tools

All screws are metric according to DIN ISO. All threads are control threads.

10.6 Inspection and maintenance plan

d = daily, w = weekly, m = monthly, a = annual

Activity	d	w	m	a
Level check of the cleaning media	x			
Check of the bath cover (seals on dirt)			x	
Cleaning of the spindle	x			
Check the lubrication of the B-axis			x	
Lubrication of the B-axis, if necessary				x

10.7 Lubrication plan

The lubrication of the thread spindle of the B-axis and the linear shafts of the B-axis should be checked once a month by visual inspection. Once a year, check the lubrication thread spindle for consistency and presence. If necessary, relubricate if necessary.

Please pay attention to the use of a suitable lubricant.

10.8 Description of the inspections and maintenance work

The filter grids of the suction and exhaust openings must be checked monthly.

The cover grids can be removed to replace the filter elements. These are merely staked out.

The filter insert can be washed with warm water or replaced by a new one. If you wash out the filter insert, make sure that it is completely dried when it is installed.

11 Disassembly and disposal

For disposal the machine components can be supplied to the electronics and metal recycling. In addition, the manufacturer accepts old components for disposal.

Dispose of used cleaning and rinsing media according to the applicable national regulations.

12 Recommendations for media and restrictions

	In general, only media with a flashpoint of at least (≥) - 20 ° C and an ignition temperature of at least (≥) 200 ° C is permitted. Observe the relevant information in the medium / solvent safety data sheet. If in doubt, contact your supplier or the manufacturer.
 DANGER	In the vicinity of the cleaning machine, the maximum daily requirement for solvents used must be stored at a minimum distance to the cleaning machine of > 3 m.

Media compatibility with material of the cleaning machine

 ATTENTION	When selecting the cleaning and rinsing media, care must be taken with their compatibility with the media contacting materials of the cleaning machine.

Media contacting materials:

- Glass
- Stainless steel 1.4301, 1.4305
- PTFE
- FKM
- Aluminium

	Also observe the safety instructions (e.g. goggles, gloves, R- and S-phrases) specified by the manufacturer or supplier for the handling of the used cleaning and rinsing media. If in doubt, consult the manufacturer or supplier.

 ATTENTION	In the case of an intended permanent use with fluorinated non-flammable solvents (e.g. for epilamation), the spindle shaft seal made of PTFE is to be replaced if necessary: In the case of use of the device for epilamization with epilamization additives / concentrates dissolved in isopropanol (isopropanol, 2-propanol, IPA), no modifications are necessary. The exclusive use of fluorinated non-flammable solvents (HFE) does not meet the requirements of explosion protection. Use with chlorinated or brominated solvents is not recommended.

12.1 Recommended cleaning media

Water-based media and / or solvent-based cleaning / rinsing media having an ignition point of at least -20 ° C and an ignition temperature of > 200 ° C and a boiling point of > 60 ° C can be used.

12.2 Restrictions

	Do not use acid based detergents. Danger of machine damage

Environmental risk through solvent-based liquids

 	The cleaning and rinsing media based on hydrocarbons are not water-miscible and are usually environmentally hazardous. Observe the labelling with warning signs and pictograms as well as the data in the safety data sheet of your intended cleaning and rinsing media. For media based on alkoxy compounds, this results to a lesser extent. Labelling is to be taken into account when dealing with the solvent-based media as well as during their disposal.