Lavamin

Instruction Manual

Manual No.: 16237025
Revision A

Date of Release 2019.08.14

Original instructions.

For:
Lavamin from serial number 62320000.

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Intended use

For professional automatic cleaning of specimens after metallographic preparation and only to be operated by skilled/trained personnel. The unit is only designed to be used with Struers specimen holder/mover plates specially designed for this purpose and this type of machine. Only for cleaning materials which are stable when exposed to water and ultrasound.

The unit is for use in a professional working environment (e.g. a materialographic laboratory).

Do NOT use the machine for:

Cleaning materials other than solid materials suitable for materialographic studies and stable when exposed to water and ultrasound. In particular, the unit must not be used for any type of explosive and/or flammable material.
Cleaning of materialographic specimens with fluids other than water.

Models:

Lavamin

NOTE:
READ the instruction manual carefully before use.
Keep a copy of the manual in an easy-to-access place for future reference.

Always state *Serial No* and *Voltage/frequency* if you have technical questions or when ordering spare parts. You will find the Serial No. and Voltage on the type plate of the machine itself. We may also need the *Date* and *Article No* of the manual. This information is found on the front cover.

The following restrictions should be observed, as violation of the restrictions may cause cancellation of Struers legal obligations:
Instruction Manuals: Struers Instruction Manual may only be used in connection with Struers equipment covered by the Instruction Manual.

Struers assumes no responsibility for errors in the manual text/illustrations. The information in this manual is subject to changes without notice. The manual may mention accessories or parts not included in the present version of the equipment.

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Lavamin
Safety Precautions[1]

Read carefully before use

1. Ignoring this information and mishandling of the equipment can lead to severe bodily injuries and material damage.

2. The machine must be installed in compliance with local safety regulations. All functions on the machine and any connected equipment must be in working order.

3. The operator(s) must read the Safety and User's Guide sections of this manual and the relevant sections of the manual for any connected equipment and accessories.

4. This machine is to be operated and maintained by skilled/trained personnel.

5. The machine must be placed on a safe and stable table with an adequate working height able to carry the machine and supplementary accessories.

6. Use water as the cleaning medium when using Lavamin. Do not use any liquids other than water as the cleaning medium.

7. Stay clear of the lid when it is closing. Do not force the lid open after it has closed.

8. Check that all retention rings are in their correct positions on the specimens before and after a cleaning step is carried out.

9. When using a specimen mover plate and individual specimens, do not use specimens with a small diameter and a low density. Small and/or light specimens may float out of the specimen mover plate and be forced to the sides of the bowl during spinning. This may result in damage to the bowl or the specimens.
Clamp the specimens in a specimen holder instead.

10. In case of power or air failure, the lid will close. Keep hands off the machine to avoid crushing fingers.

11. Operators should ensure that the actual voltage corresponds to the voltage on the rear of the machine. The machine must be earthed. Follow the local regulations. Always turn the power off and remove the plug or the cable before dismantling the machine or installing additional components.

12. When working at machines with rotating parts care must be taken that clothes and/or hair cannot be caught by the rotating parts. Appropriate safety clothing must be used.

[1] From Safety Precaution sheet, Revision B

13. If you observe malfunctions or hear unusual noises - stop the machine and call technical service.

14. The machine must be disconnected from the mains prior to any service.
Wait 5 minutes until residual potential on the capacitors is discharged.

15. Do not cycle mains power more than once every three minutes. Damage to the drive will result.

16. In case of fire, alert bystanders and the fire brigade, and cut power. Use a powder fire extinguisher. Do not use water.

The equipment should only be used for its intended purpose and as detailed in the Instruction Manual.

The equipment is designed for use with consumables supplied by Struers. If subjected to misuse, improper installation, alteration, neglect, accident or improper repair, Struers will accept no responsibility for damage(s) to the user or the equipment.

Dismantling of any part of the equipment, during, service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.)

Icons and typography

Struers uses the following icons and typographical conventions.
A list of the Safety Messages used in this manual can be found in the chapter on Cautionary Statements.

Always consult the Instruction Manual for information on the potential hazards marked by the icons fixed to the machine.

Icons and Safety Messages

ELECTRICAL HAZARD

indicates an electrical hazard which, if not avoided, will result in death or serious injury.

DANGER

indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION

indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

CRUSHING HAZARD

indicates a crushing hazard which, if not avoided, could result in minor, moderate or serious injury.

General Messages

NOTE:
indicates a risk of damage to property, or the need to proceed with special care.

HINT:
indicates additional information and tips.

Colour Inside Logo

The 'colour inside' logo on the cover page of this Instruction Manual indicates that it contains colours which are considered to be useful for the correct understanding of its contents.
Users should therefore print this document using a colour printer.

Typographic conventions

Bold type	indicates button labels or menu options in software programs
Italic type	indicates product names, items in software programs or figure titles
Blue text	indicates a link to another section or webpage
Alt + ←	return to last point of focus in electronic version of manual.
■ Bullets	indicates a necessary work step

User's Guide

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1. Getting Started

Device description

Lavamin is an automatic cleaning unit for cleaning of specimens after metallographic preparation using only water. The specimens must be stable when exposed to water and ultrasound. The specimens are either clamped in a specimen holder or with retention rings placed in a specimen mover plate. The specimen holder/mover plate must in balance.

Lavamin is designed for specimen holders up to 160 mm dia. with a max. total weight of 2.5 kg (5.5 lb) and for specimen mover plates up to 165 mm dia.

Small and light specimens placed in a specimen mover plate must be held in place during cleaning by a rubber mat.

The cleaning process starts by the operator inserting the balanced specimen holder/mover plate into the unit. The unit is closed manually by pressing the top cover down. The cleaning program is selected and started by pressing a program key on the front panel.

The unit stops automatically and the cover opens. The operator can then remove the cleaned specimen holder/mover plate including the specimens.

Checking the Contents of the Packing Box

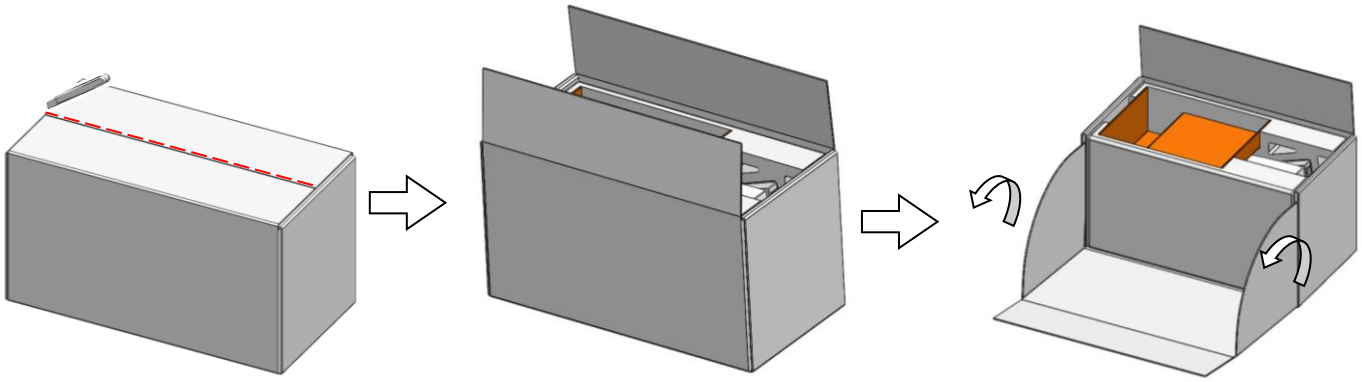
In the packing box you should find the following parts:

1 Lavamin
1 Connection piece (p6 to 1/8")
(to connect Lavamin to standard 1/8" compressed air supply)
1 Connection piece
(to connect Lavamin to a Tegramin air outlet)
1 Water inlet hose 19mm/ ¾" (2.5 m)
1 Y-connector for water inlet
1 Filter gasket 3/4"
1 Reduction ring with gasket ¾" to ½"
1 Water outlet hose 30 mm/ 1¼" dia. (1.5 m)
2 Hose clamps 25-40 mm dia.
1 Hose clamp 11 mm dia.
2 Mains cables
1 Set of Retention rings for single specimens. 15 pcs of each size
25 mm - 1” dia.
30 mm – 1.25” dia.
40 mm – 1.5” dia.
50 mm – 2” dia.
1 Levelling Tool (for single specimens)
2 Rubber mats
(for light specimens in Specimen mover plates)
1 Grate plate set
1 Grate plate
2 Rubber feet
1 Instruction
1 Instruction Manual set

Unpacking Lavamin

NOTE:
Always lift Lavamin from underneath the machine

- Cut the packing tape on the top of the box.
- Fold out the side of the box (see illustration).



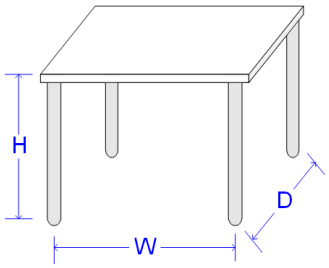
- Remove the bag of loose parts.
- Remove Lavamin from the box.

HINT:
Store the packing crate, bolts and brackets for use whenever Lavamin is transported/re-located.
Failure to use the original packaging and fittings could cause severe damage to the machine and will void the warranty.

Placing Lavamin

- The machine must be placed on a safe and stable table with an adequate working height and which is able to carry the machine and supplementary accessories and consumables.
- Ensure that the work station has adequate lighting. Avoid direct glare (dazzling light sources within the operator's line of vision) and reflected glare (reflections of light sources).

Recommended workbench dimensions



Height: Recommended 80 cm / 31.5”
Width: min. 70 cm / 27.6”
Depth: min. 80 cm / 31.5”

- Check that the machine is resting securely with all 4 rubber feet on the table.
  (For greatest accuracy, the machine must be completely level - tolerance ±1 mm).
- The machine must be close to the power supply

Recommended Space

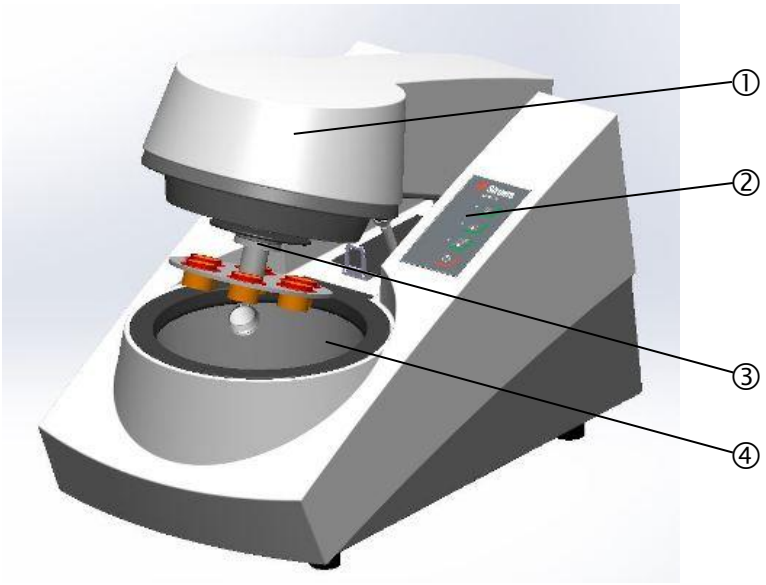
To facilitate easy access for servicing, allow sufficient space around the machine.

Getting Acquainted with Lavamin

Please familiarise yourself with the location and names of all the Lavamin components:

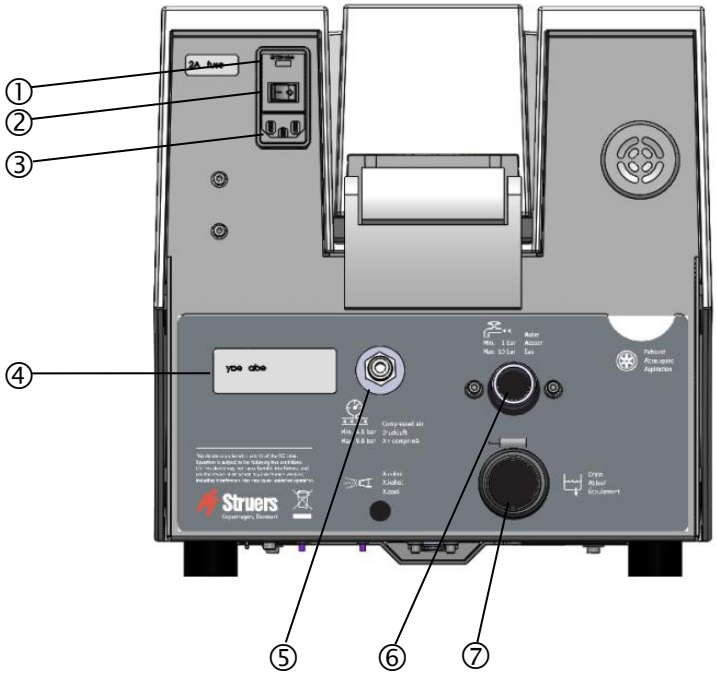
MAIN SWITCH
The main switch is located at the rear of Machine.
In case of an emergency switch off the machine on main switch.

Front of Lavamin



① Lid
② Control panel
③ Coupling flange
④ Bowl

Rear view



①	Fuse
②	Main switch
③	Mains connection
④	Type Plate
⑤	Compressed air inlet
⑥	Water inlet
⑦	Water outlet

Supplying Power

ELECTRICAL HAZARD

Switch the power off when installing electrical equipment.
The machine must be earthed (grounded).
Check that the mains voltage corresponds to the voltage stated on the type plate on the side of the machine.
Incorrect voltage may result in damage to the electrical circuit.

Lavamin is shipped with 2 types of Mains cables:

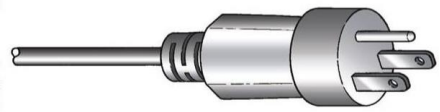
Connection to the Machine

All cables are equipped with an IEC 320 cable connector that has to be connected to the Lavamin.

Single-phase Supply

The 2-pin (European Schuko) plug is for use on single-phase connections.
If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug. The leads must be connected as follows:

Yellow/green:	earth (ground)
Brown:	line (live)
Blue:	neutral



The 3-pin (North American NEMA 5-15P) plug is for use on single-phase connections.
If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug. The leads must be connected as follows:

Green:	earth (ground)
Black:	line (live)
White:	line (live)

Changing the Voltage Setting

The factory setting for Lavamin is 200-240V / 50-60Hz.

Information
If the factory setting is not the correct setting for your mains supply the setting can be changed to 100-120V / 50-60Hz:

- Pull out the fuse holder at the back of the machine.
- Turn the fuse to the correct setting.

Voltage Required	**Setting**
200-240V / 50-60Hz	230V
100-120V / 50-60Hz	115V

- Re-insert the fuse holder.

Supplying Water

Water may be supplied from the water mains.

Important
The cold water supply must have a head pressure in the range 1.8 – 9.9 bar (26 – 143 psi).

Tip
With new water pipe installations, leave the water to run for a few minutes to flush any debris from the pipe, before connecting to Lavamin.

Tip
Lavamin can be connected to the same water supply as e.g. Tegramin by using the Y-connector supplied.

- Mount the 90° end of the inlet hose onto the water inlet on the back of Lavamin (see Getting Acquainted with Lavamin):
  - Insert the filter gasket in the coupling nut with the flat side against the pressure hose.
  - Tighten the coupling nut completely.

Connection to Water Mains

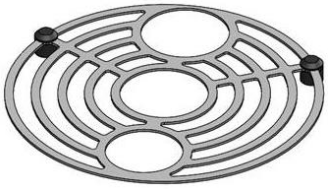
- Mount the straight end of the inlet hose on the water mains tap for cold water:
  - If required, mount the reduction piece with gasket on the water mains tap and tighten the coupling nut completely.

Connection to Water Outlet

- Mount the outlet hose onto the water outlet pipe. (Lubricate with grease or soap to facilitate insertion.) Use a hose clamp for fastening.
- Lead the other end of the drain hose to the water outlet. Arrange the hose so that it slopes downward towards the drain throughout its length. Shorten the hose, if necessary.

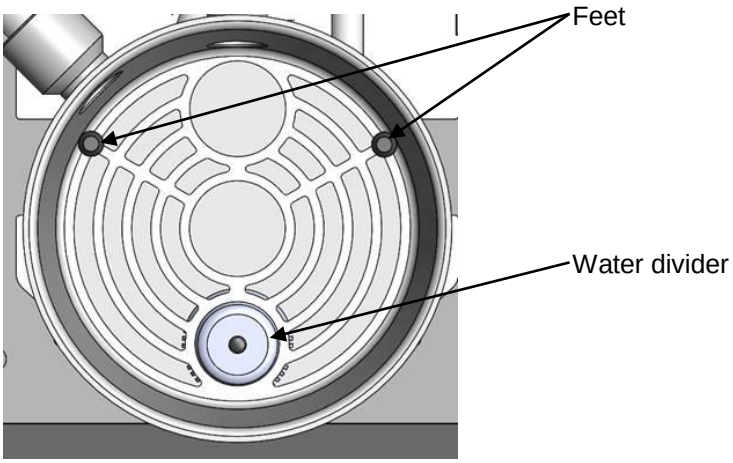
Tip
Make sure that the drain hose slopes downward towards the drain throughout its entire length and avoid sharp bends in the drain hose.

Inserting the Grate Plate



The grate plate will prevent damage to the ultrasound unit in the bottom of the bowl if a specimen holder is accidentally dropped.

- Place the Grate plate in the bowl such that the plate is horizontal.
  - The long section of the feet should be placed downwards.
  - Fit the smaller hole over the water divider.



Compressed Air Connections

To connect compressed air:

- Mount the quick coupling on the compressed air hose and secure it with the hose clamp supplied.
- Connect the air inlet hose to the quick coupling and fit the other end into the compressed air inlet on Lavamin.

T-connection piece

IMPORTANT
The air pressure must be between 4.5 bar (65 psi) and 7 bar (101 psi) and have a quality equal to or better than Class-3, as specified in ISO 8573-1.
Cleaning program 3 requires an air flow of 200 l/min

Tip
Lavamin can be connected to the same water supply as e.g. Tegramin by using the Y-connector supplied.

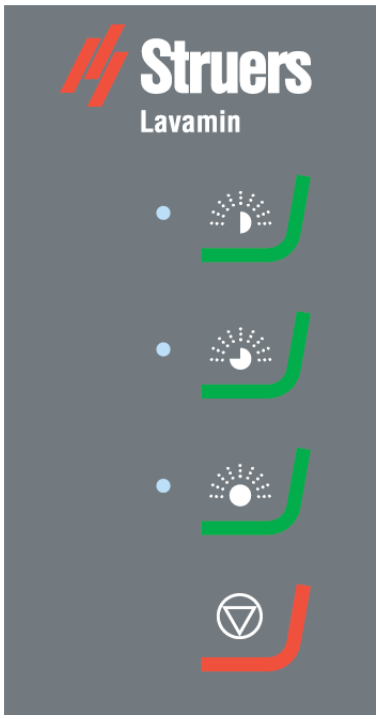
Noise Level

See Technical Data in the rear of the Instruction Manual for information on the sound pressure level value.

CAUTION
Prolonged exposure to loud noises may cause permanent damage to hearing. Use hearing protection if exposure to noise exceeds levels set by local regulations.

2. Basic Operations

Front Panel



Cleaning Program 1

Cleaning Program 2

Cleaning Program 3

STOP

Cleaning Programs Lavamin has three cleaning programs:

Cleaning Program 1 For cleaning and drying in-between preparation steps.
(Approx. 1 min)
No air flushing, residual humidity can occur.

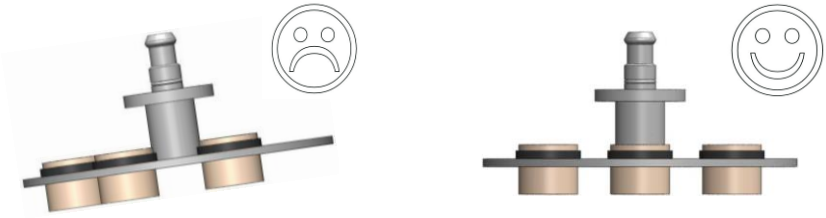
Cleaning Program 2 For cleaning and drying of dirty specimens.
(Approx. 1½ min)
No air flushing, residual humidity can occur.

Cleaning Program 3 For final cleaning and drying of specimens.
(Approx. 2 min)
With air flushing, no residual humidity.

Clamping and Levelling Specimens

The specimens **must be evenly distributed** in the specimen holder/ specimen mover plate. They should have approximately the same size and weight.

Important
If the specimen holder / specimen mover plate is not balanced, this will result in excess vibration during cleaning.



In a Specimen Holder

If using a Uniforce Levelling device, please refer to the instructions in the Uniforce manual.

- Place the specimen holder on the Uniforce levelling device or on a levelling disc.
- Arrange at least three specimens symmetrically around the centre of the specimen holder to ensure an even and balanced rotation.
- Clamp the specimens by carefully tightening the screws. Always choose a length of screw which will leave a minimum part of the screw projecting from the specimen holder and which uses the whole length of the thread through the specimen holder.
- After clamping, make sure that the fixation of the specimens is absolutely firm.

Individual specimens

Individual specimens must be fitted with a retention ring and suspended from the specimen mover plate.

Important
Specimen mover plates of 4 mm thickness should be used.
If specimen mover plates of 2 mm are used, the holes should fit the diameter of the specimens, otherwise the specimens may be flung out of the mover plate during spinning.

Specimen Weight/density:

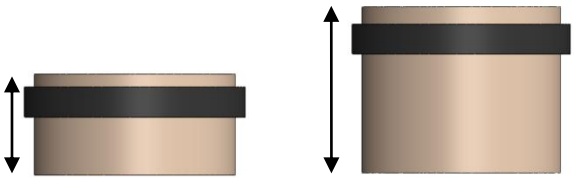
The specimens must have a density higher than water.
Specimens with a lower density will float out of the specimen mover plate and be forced to the sides of the bowl during spinning.
This may result in damage to the bowl or the specimens.

Use a Rubber mat to keep small and light specimens in place.

- Select the Rubber mat that fits the size of the specimen mover plate (140 or 160 mm dia.).
- Place the mat on the specimen mover plate and check that the holes (for the pressure feet) are directly over the specimens.
- Leave the mat in place during preparation.

Specimen Height:

Individual specimens should be between 20 – 28 mm.
(Taller specimens can also be used – see page 25 for details.)



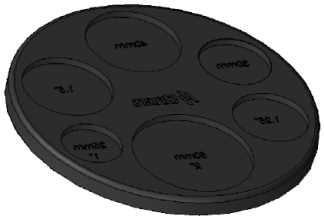
20 mm / 0.8" **28 mm / 1.1"**

Fitting a Retention Ring

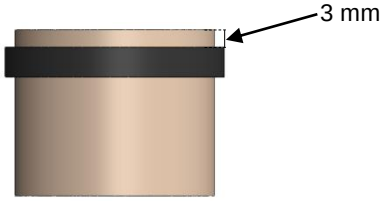
Important
The retention rings must fit tightly around the diameter of the specimen.

Retention rings can be fitted using the levelling tool supplied or an Applicator (optional accessory).

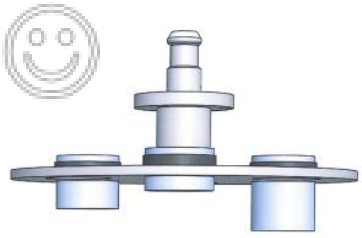
Levelling tool

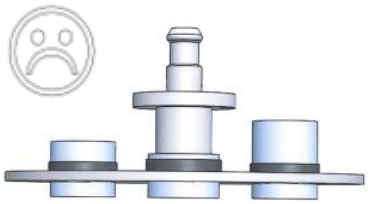


- Place the specimen in the levelling tool - with the face to be prepared downwards.
- Slide the retention ring over the specimen and push a few millimetres down the side of the specimen.
- Turn the specimen upside down and place in the correct aperture of the levelling tool.
- Press the retention ring down until it rests on the surface of the levelling tool.
  The back of the specimen should protrude 3 mm through the retention ring.



Important
The retention rings must be placed on top of the specimens, otherwise the specimens may fall off the specimen mover plate during cleaning.





Applicator for retention rings

- Place one or more retention rings on the Applicator.
- Place the Applicator on top of the specimen and slide a retention ring down, over the cone.
- Press the retention ring until it rests level with the bottom edge of the cone.
- Transfer the specimen to the specimen mover plate.

Important
Check that all retention rings are in their correct positions on the specimens before and after a cleaning step is carried out.
If necessary, re-level the retention rings or exchange loose rings with new rings.

Taller Specimens
Specimens 28- 32 mm.

- Move the retention ring further away from the top of the specimen to reduce the portion that extends out of the specimen mover plate
- Check that the specimen will not come into contact with the water inlet/outlet during cleaning.

Note
Because of the high rotation speed the specimen must not be "top-heavy" to avoid it being flung out of the mover plate.

Cleaning Specimens

- After the preparation step is finished, remove the specimen holder / specimen mover plate from the specimen mover head.
- On Lavamin, press the coupling flange downwards and insert the specimen holder / specimen mover plate.
- Rotate the specimen holder / specimen mover plate until the three pins from the coupling engage in the corresponding holes of the specimen holder / specimen mover plate.
- Release the flange.
  Check that the specimen holder / specimen mover plate is securely fixed in the coupling.

Tip
Hold the specimen holder / specimen mover plate with one hand. Use the other hand to operate the coupling.

Starting the Cleaning Process

- Press the key of the appropriate cleaning program to start the cleaning process.

When the cleaning program is finished, the lid will open up automatically and the specimen holder / specimen mover plate can be removed.

3. Operator Maintenance

Important
Do not clean the bowl with compressed air.
The water level sensor may be damaged if subjected to pressurised air.

Daily Maintenance

- To prevent the output filter from clogging the bottom of the bowl, remove any particles that were not pumped out. Any discoloration left by the particles may not be removed completely.
- Wipe the bowl with a damp cloth.

Weekly Maintenance

- Wipe the surface of Lavamin with a damp cloth and water with a dash of ordinary washing-up liquid.

Important
Do not use alcohol, acetone or similar solvents.

- Clean the bowl with a household scouring pad (do not use a metal scourer).
- Check the water and air connections.

Yearly

Testing Safety Devices

The lid has a safety switch system to prevent the motor from rotating while the lid is open.

NOTE*:*
Testing should always be performed by a qualified technician (electromechanical, electronic, mechanic, pneumatic etc.)

Lid safety switch system

- Close the lid.
- Start a cleaning program. The machine starts operating.
- Try to open the lid. Do NOT use force.
  If the lid can be opened and the motor is rotating, press Stop ▽ and contact Struers Service.

- Start a cleaning program with open lid.
- If the motor starts rotating, press Stop ▽ and contact Struers Service.

- Check the safety-catch for correct function.

The safety-catch must slide unobstructed into the locking mechanism.
If it does not, call Struers Service.

WARNING
Do NOT use the machine with defective Safety Devices. Contact Struers Service.

Spare Parts

Please see Spare Parts and Diagrams in the Reference Guide section of the Instruction Manual.

4. Trouble-Shooting

LED Error Signals

	Explanation	**Action required**
● ○ ○	Vibrations are too high.	Check that specimen holder is balanced.
○ ● ○	Water inlet error.	Check water supply.
● ● ○	Water drainage error.	Check if water drain is blocked.
○ ○ ●	No air pressure.	Check air supply.
● ○ ●	Specimen holder is blocked.	Check for obstructions. Check that specimen holder is balanced.
○ ● ●	Lid not down after process start (15 sec. timeout)	Check for obstructions.
● ● ●	System error.	Press a cleaning program key to show the system error number. Contact a Struers Service Technician.

■ Press STOP ▽ to clear the signal.

System Error Number

The system error number will help the Struers Service Technician identify the error.
To show the system error number:

- Press a cleaning program key.
  The three LEDs will start blinking.
  LED 1 shows the first digit
  LED 2 shows the second digit
  LED 3 shows the third digit

E.g:
LED 1 blinks once, LED 2 blinks three times, and LED 3 blinks twice:
System error number is #132.

- Press STOP ▽ to clear the signal.
  (If the system error halted the software system, it will be necessary to switch Lavamin off at the Main switch.)

5. Cautionary Statements

ELECTRICAL HAZARD

Switch the power off when installing electrical equipment.
The machine must be earthed (grounded).
Check that the mains voltage corresponds to the voltage stated on the type plate on the side of the machine.
Incorrect voltage may result in damage to the electrical circuit.

CAUTION

Prolonged exposure to loud noises may cause permanent damage to hearing.
Use hearing protection if exposure to noise exceeds levels set by local regulations.

WARNING

Do NOT use the machine with defective Safety Devices.
Contact Struers Service.

WARNING

Safety critical components are to be replaced after a maximum lifetime of 20 years.
Contact Struers Service for information.

6. Transport and Storage

NOTE*:*, Store the packing box and foam packaging for future use Failure to use the original packaging and fittings could cause severe damage to the tester and will void the warranty.

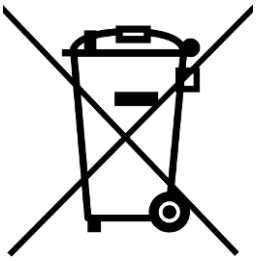
Follow these steps:

- Check that there is no specimen holder in the machine.
- Clean the machine.
- Disconnect power, water and compressed air.
- Move the machine to its new location.

If the machine is bound for long-time storage or shipping, follow these additional steps:

- Clean the machine.
- Wrap the machine in plastic (place dessicant (silica gel) with the machine).
- Place the machine in the transport box and tape closed.

NOTE:
Package the machine securely before transportation.
Insufficient packaging could cause damage to the machine and will void the warranty. Contact Struers Service for advice.
Struers recommends that all original packaging and fittings are kept for future use.



7. Disposal

Equipment marked with a WEEE symbol contain electrical and electronic components and must not be disposed of as general waste.
Please contact your local authorities for information on the correct method of disposal in accordance with national legislation.

Reference Guide

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1. Struers Knowledge

Mechanical preparation is the most common method of preparing materialographic specimens for microscopic examination. The specific requirement of the prepared surface is determined by the particular type of analysis or examination. Specimens can be prepared to the perfect finish, the true structure, or the preparation can be stopped when the surface is acceptable for a specific examination.

HINT:
For further information, see the section on Grinding and Polishing on the Struers website.

2. Accessories and Consumables

Please refer to the Lavamin brochure for details of the range available.

3. Spare Parts and Diagrams

For further information, or to check the availability of other replacement parts, please contact your local Struers Service department. Contact information is available on Struers.com.

Safety Related Parts of the Control System (SRP/CS)

Safety Related Part	Manufacturer / Manufacturer Description	Manufacturer Cat. no.	El.Ref.	Struers Cat. no:
Safety Relay	Omron Safety Relay Unit	G9SB-3012-A	KS1	2KS10006
Interlock Magnetic Sensor	Schmersal Safety Sensor	BNS 120-02Z	SS1	2SS00130
Interlock Magnetic Actuator	Schmersal Safety Sensor Actuator	BP 10	SS1	2SS00131
Interlock Switch	Schmersal Safety Switch	AZ 17-02ZK	YS1	2SS00171
Interlock Switch Actuator	Schmersal Safety Switch Actuator	AZ 17/170-B5	YS1	2SS10020
Pneumatic System	Struers Lavamin Pneumatic System	16233561	Y1, Y2, Y3	16233561

WARNING

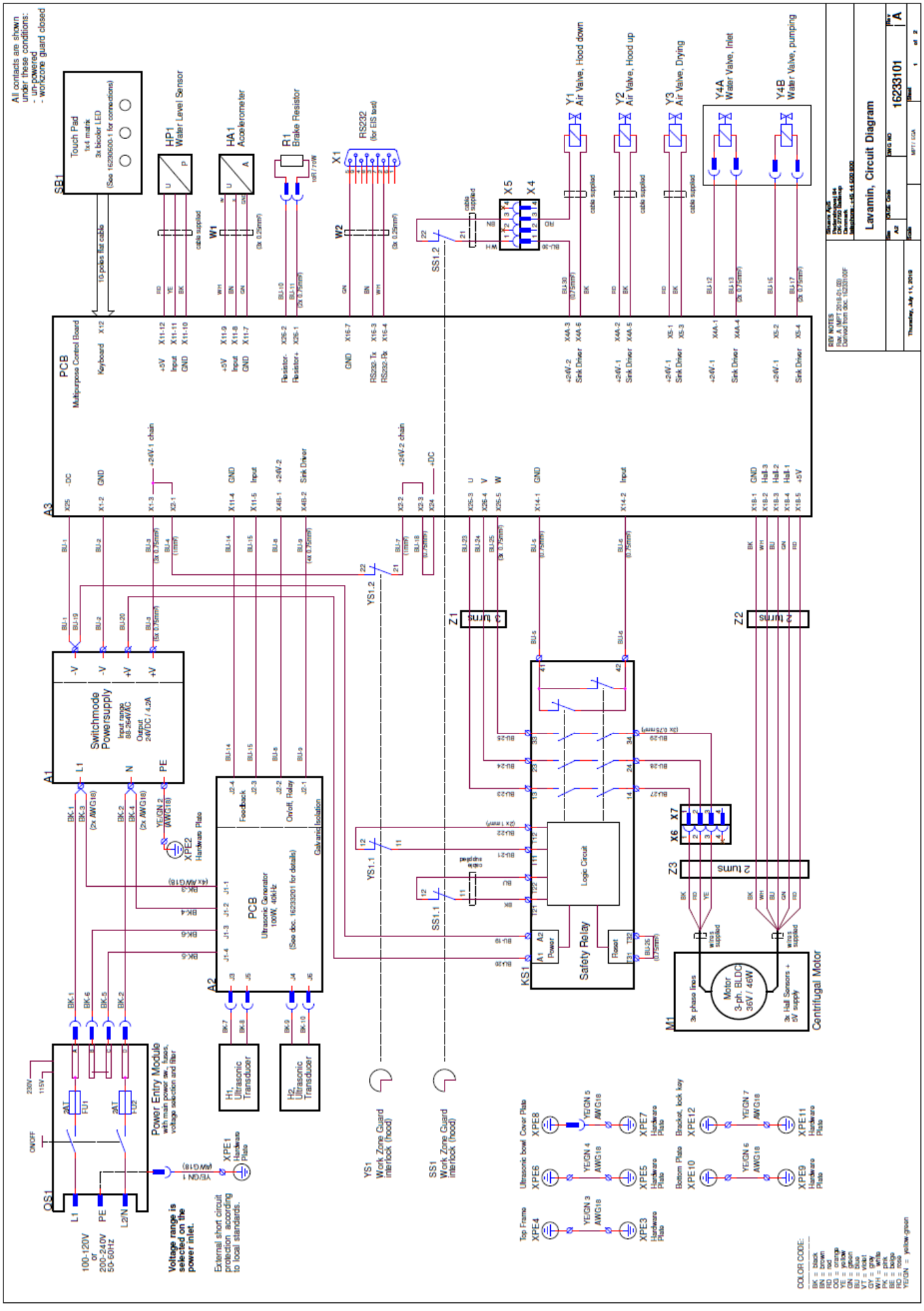
Safety critical components are to be replaced after a maximum lifetime of 20 years.
Contact Struers Service for information.

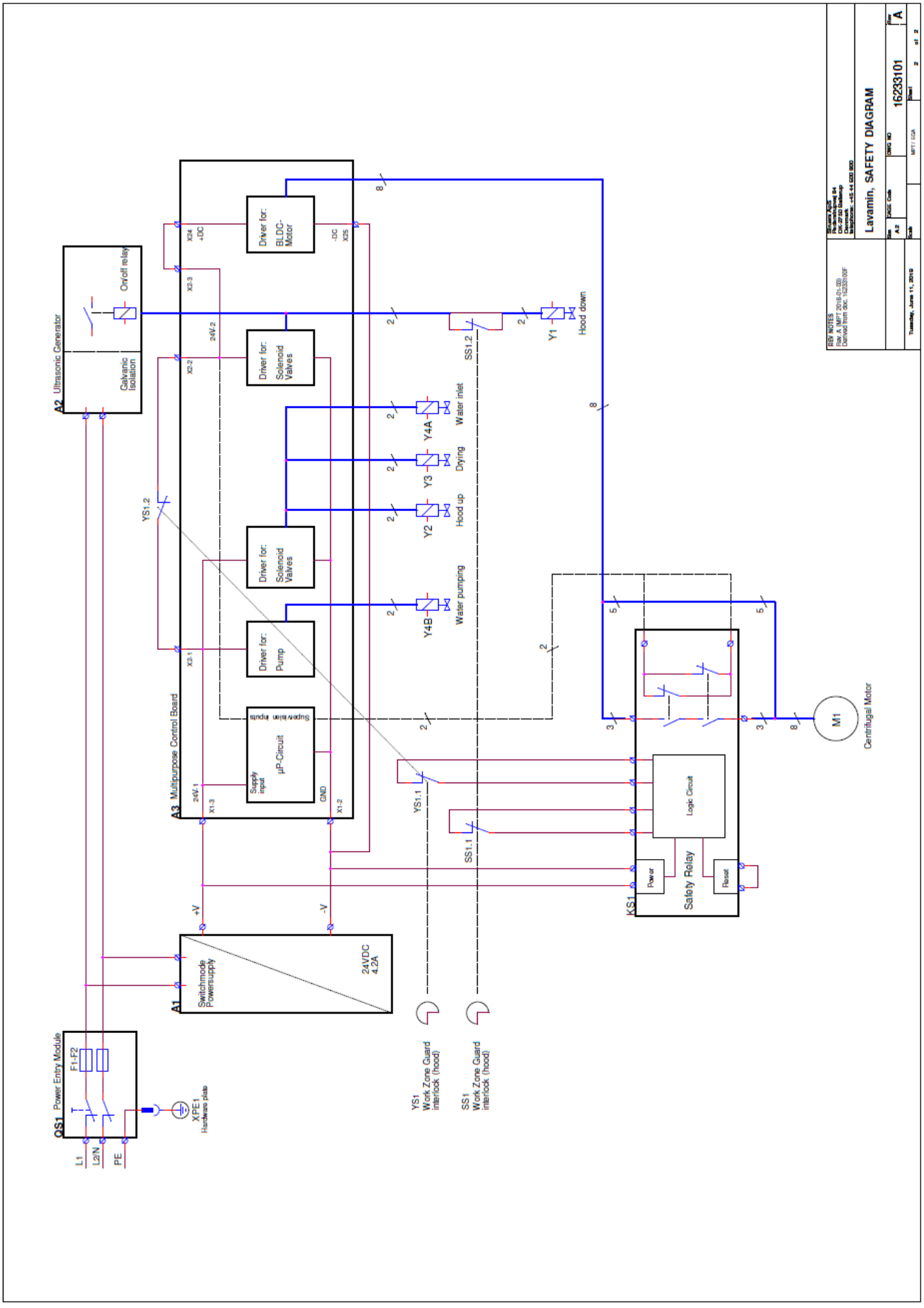
NOTE:
Replacement of Safety critical components can only be performed by a Struers engineer or a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).
Safety critical components may only be replaced by components with at least the same safety level.

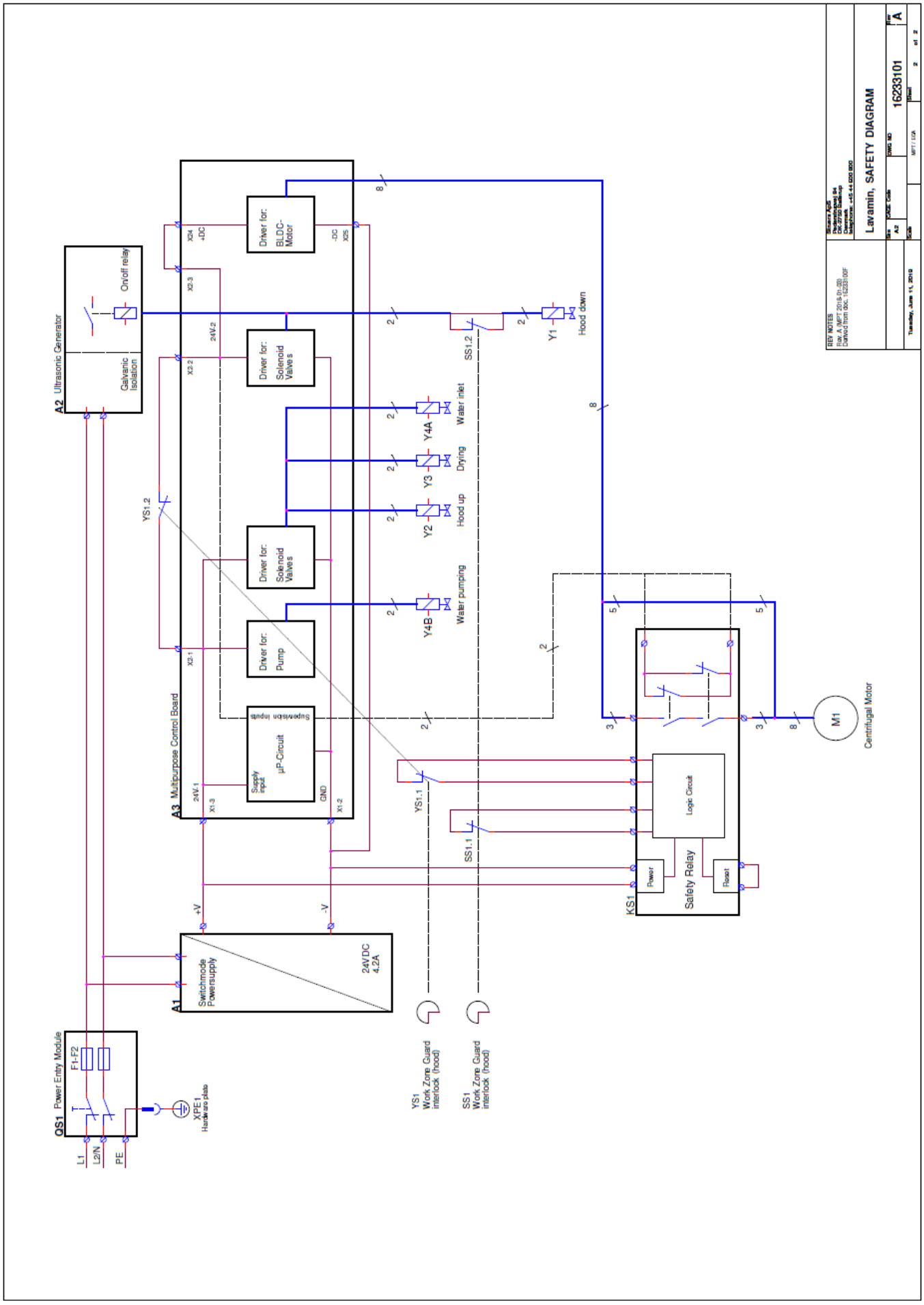
Contact Struers Service for information.

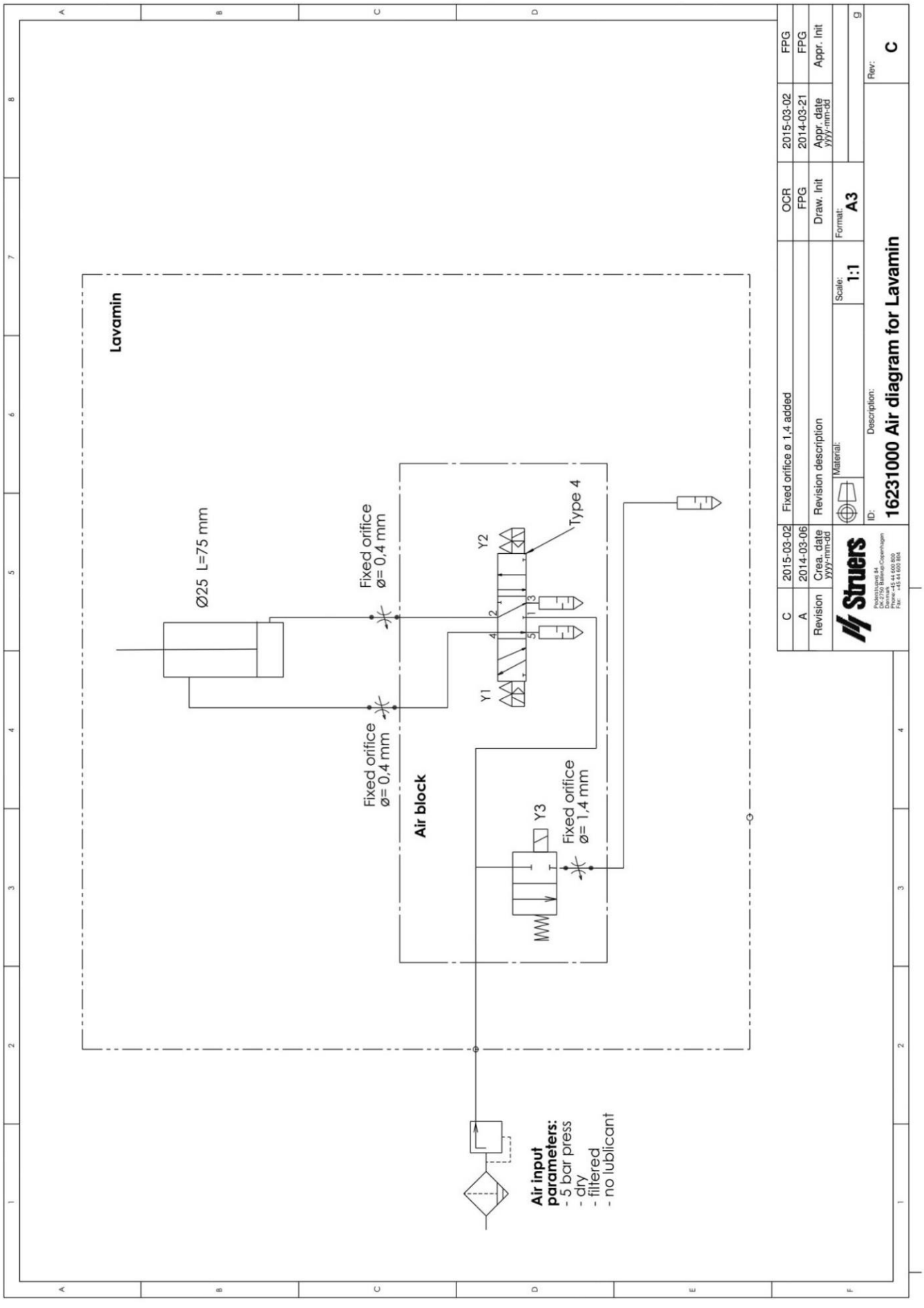
Circuits and Diagrams

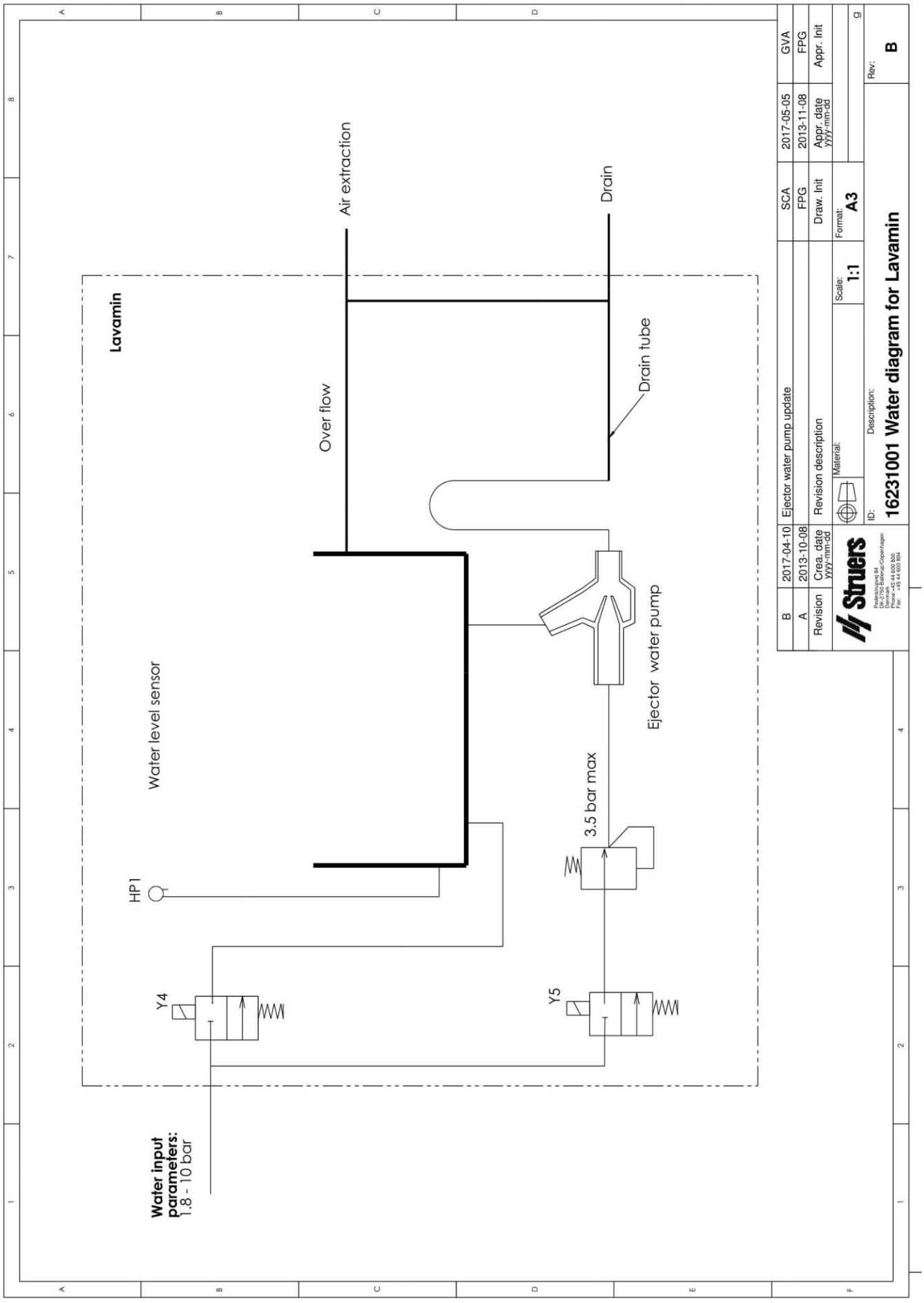
See the following pages.


Lavamin, Circuit Diagram
16233101
A
Thursday, July 11, 2019
REV NOTES
Rev. A (MPT 2018-01-09)
Derived from doc. 16233100F
All contacts are shown under these conditions:
- un-powered
- workzone guard closed
SB1
Touch Pad
HP1
Water Level Sensor
HA1
Accelerometer
R1
Brake Resistor
X1
RS232
(for EIS test)
W1
W2
A3
PCB
Multipurpose Control Board
A1
Switchmode Powersupply
A2
PCB
Ultrasonic Generator
100W, 40kHz
H1, Ultrasonic Transducer
H2, Ultrasonic Transducer
Z1
Z2
Z3
2 turns
X5
X4
X6
X7
SS1.2
YS1.2
YS1.1
SS1.1
KS1
Safety Relay
Logic Circuit
M1
Motor
3-ph. BLDC
36V / 46W
Centrifugal Motor
Y1
Air Valve, Hood down
Y2
Air Valve, Hood up
Y3
Air Valve, Drying
Y4A
Water Valve, Inlet
Y4B
Water Valve, pumping
QS1
Power Entry Module
with main power on/off switch, voltage selection and filter
100-120V
or
200-240V
50-60Hz
Voltage range is selected on the power inlet.
External short circuit protection according to local standards.
YS1
Work Zone Guard interlock (hood)
SS1
Work Zone Guard interlock (hood)
XPE1 Hardware Plate
XPE2 Hardware Plate
XPE3 Hardware Plate
XPE4 Hardware Plate
XPE5 Hardware Plate
XPE6 Hardware Plate
XPE7 Hardware Plate
XPE8 Hardware Plate
XPE9 Hardware Plate
XPE10 Hardware Plate
XPE11 Hardware Plate
XPE12 Hardware Plate
Top Frame
Ultrasonic bowl Cover Plate
Bottom Plate
Bracket, lock key
COLOR CODE:
BK = black
BN = brown
RD = red
OG = orange
YE = yellow
GN = green
BU = blue
VI = violet
GY = grey
WH = white
PK = pink
BG = beige
TQ = turquoise
YEGN = yellow-green


Lavamin, SAFETY DIAGRAM
16233101
A2 Ultrasonic Generator
On/off relay
Galvanic Isolation
A3 Multipurpose Control Board
Driver for: BLDC-Motor
Driver for: Solenoid Valves
Driver for: Solenoid Valves
Driver for: Pump
Supervision inputs
µP-Circuit
Supply input
GND
24V-1
24V-2
+DC
-DC
X1-3
X1-2
X2-1
X2-2
X3-3
X24
X25
YS1.2
YS1.1
SS1.1
SS1.2
Y1 Hood down
Y2 Hood up
Y3 Drying
Y4A Water inlet
Y4B Water pumping
A1 Switchmode Powersupply
24VDC 4.2A
+V
-V
KS1 Safety Relay
Logic Circuit
Power
Reset
M1 Centrifugal Motor
QS1 Power Entry Module
F1-F2
XPE1 Hardware plate
L1
L2/N
PE
YS1 Work Zone Guard interlock (hood)
SS1 Work Zone Guard interlock (hood)


Lavamin, SAFETY DIAGRAM
16233101
A2 Ultrasonic Generator
On/off relay
Galvanic Isolation
A3 Multipurpose Control Board
Driver for: BLDC-Motor
Driver for: Solenoid Valves
Driver for: Solenoid Valves
Driver for: Pump
Supervision inputs
Supply input
µP-Circuit
GND
Hood down
Water inlet
Drying
Hood up
Water pumping
Y1
Y4A
Y3
Y2
Y4B
SS1.2
YS1.2
YS1.1
SS1.1
KS1
Safety Relay
Logic Circuit
Power
Reset
M1
Centrifugal Motor
A1
Switchmode Powersupply
24VDC 4.2A
QS1 Power Entry Module
F1-F2
XPE1
Hardware plate
L1
L2/N
PE
YS1
Work Zone Guard interlock (hood)
SS1
Work Zone Guard interlock (hood)


Lavamin
Ø25 L=75 mm
Fixed orifice
ø= 0,4 mm
Fixed orifice
ø= 0,4 mm
Air block
Y1
Y2
Type 4
Y3
Fixed orifice
ø= 1,4 mm
Air input
parameters:
- 5 bar press
- dry
- filtered
- no lublicant
C 2015-03-02 Fixed orifice ø 1,4 added OCR 2015-03-02 FPG
A 2014-03-06 FPG 2014-03-21 FPG
Revision Crea. date yyyy-mm-dd Revision description Draw. Init Appr. date yyyy-mm-dd Appr. Init
Struers
Material:
Scale: 1:1
Format: A3
ID:
Description:
16231000 Air diagram for Lavamin
Rev: C


Lavamin
Air extraction
Drain
Over flow
Drain tube
Water level sensor
Ejector water pump
HP1
3.5 bar max
Y4
Y5
Water input parameters:
1.8 - 10 bar
B 2017-04-10 Ejector water pump update
A 2013-10-08
Revision Crea. date yyyy-mm-dd Revision description
SCA 2017-05-05 GVA
FPG 2013-11-08 FPG
Draw. Init Appr. date yyyy-mm-dd Appr. Init
Material:
Scale: 1:1
Format: A3
Struers
ID:
Description:
16231001 Water diagram for Lavamin
Rev: B

4. Technical Data

Subject		Specifications	
		Metric/International	**US**
Physical Specifications			
Water Supply	Tap Water		
	Pressure for tap water	1.8 - 9.9 bar	26 - 143 psi
	Inlet	¾"	¾"
Compressed Air	Pressure Flow	min. 4.5 max. 7 bar 200 l/min	min. 65 psi max. 101 psi 200 l/min
Electrical Supply and Consumption	Voltage/frequency	200-240V / 50-60Hz	100-120V / 50-60Hz
	Power phases	1-phase (N+L1+PE) or 2-phase (N+L2+PE)	
	Power consumption: Idle Max	 2.5 W 140 W @ 200-240V	 2.5 W 140 W @100-120V
	Current	0.7 A @ 200-240V	1.2 A @100-120V
Dimensions and Weight	Width	317 mm	12.5”
	Depth	629 mm	24.8”
	Height, closed lid open lid	325 mm 488 mm	12.1" 19.2"
	Weight	17 kg	37.5 lbs
	Capacity	1.7 l	0.45 Gallon
Standards Specifications			
EU Directives		Please refer to the Declaration of Conformity	
Safety Circuit Categories	Rotation of specimen mover holder	EN 60204-1, Stop Category 0 EN ISO 13849-1, Cat. 3, PL d	
	Down movement of hood	EN 60204-1, Stop Category 0 EN ISO 13849-1, Cat. 1, PL c	

Subject		**Specifications**	
		Metric/International	**US**
Environmental Specifications			
Noise Level	A-weighted sound emission pressure level at workstations	L_PA = 57 dB (A) measures value Uncertainty K = 4 dB Measurements made in accordance with EN ISO-11202:2010	
	Equivalent ultrasound pressure level (equivalent level of ultrasound)	L_{Teq},T = 90.2 dB measured value Uncertainty K = 2 dB Measurements made in accordance with EN ISO-61010-1:2010 (chapter 12.5)	
	DECLARED DUAL-NUMBER NOISE EMISSION VALUES in accordance with EN ISO-4871:2009		
Operating Environment	Temperature (operational)	5–40ºC	41–104ºF
	Humidity (non-condensing)	35 - 85 % RH	
Storage / transport Conditions	Surrounding temperature	0 – 60°C	32 – 140°F
	Humidity	< 90% RH non-condensing	
Interface Specifications			
Controls		Touch pad	

No.: 16237037
Revision A

Date of Release: 2019.07.12

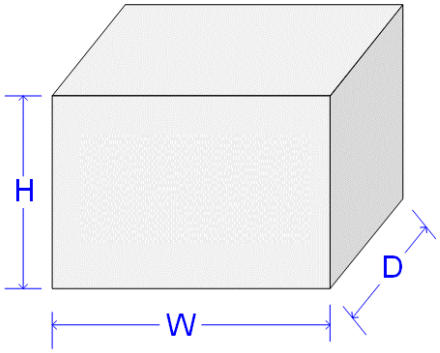
Lavamin, Pre-Installation Checklist

Read the Installation instructions in the Instruction Manual *before* installing the machine.

Installation Requirements

- Power supply
- Compressed air
- Water supply
- Drain
- Workbench
- Knife for opening the transport box

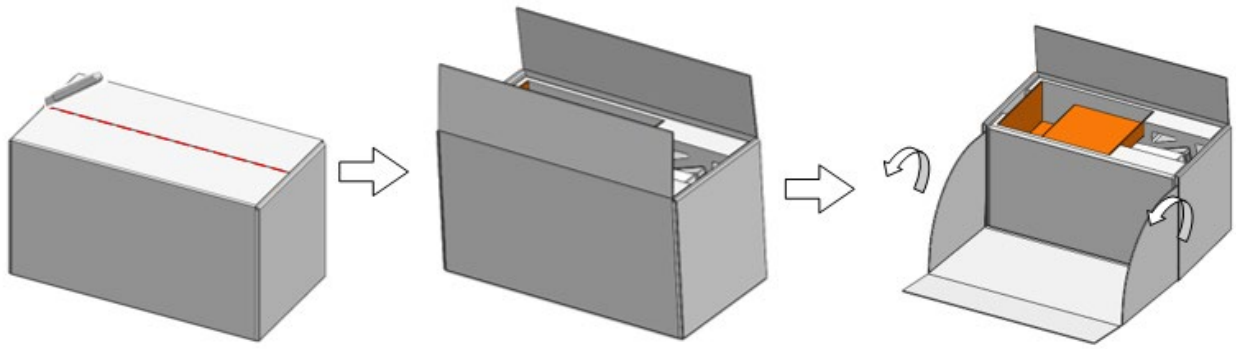
Crating Specifications



H	41 cm / 16“
W	75 cm / 29“
D	38 cm / 15“
Weight	23 kg / 51 lbs

Unpacking

- Cut the packing tape on the top of the box.
- Fold out the side of the box (see illustration).

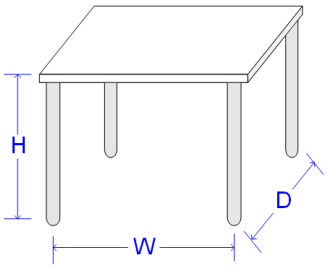


- Remove the bag of loose parts.
- Remove Lavamin from the box.

Location

- The machine must be placed close to the power supply.
- The machine is designed to be placed on a stable workbench with a horizontal surface.

Recommended dimensions:



Height: Recommended 80 cm / 31.5”
Width: 50 cm / 20”
Depth: 90 cm / 35”

Recommended workbench dimensions. Height of table (H) follows local preferences.

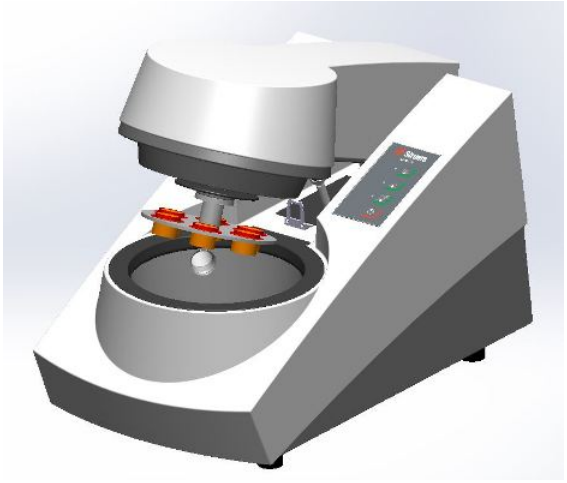
- To facilitate easy access for service technicians, allow sufficient space around the machine.

Recommended Space

Front: Recommended space at the front: 100 cm / 40”.

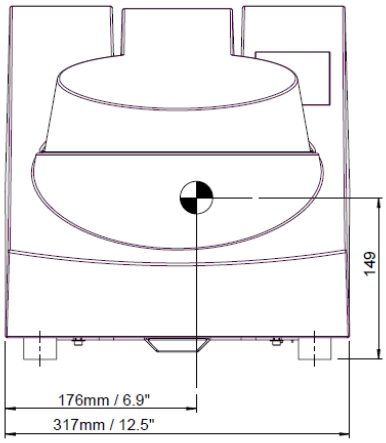
Dimensions

Width	317 mm	12.5”
Depth	629 mm	24.8”
Height, Closed **Open**	325 mm 488 mm	12.1" 19.2"
Weight	17 Kg	37.5 lbs

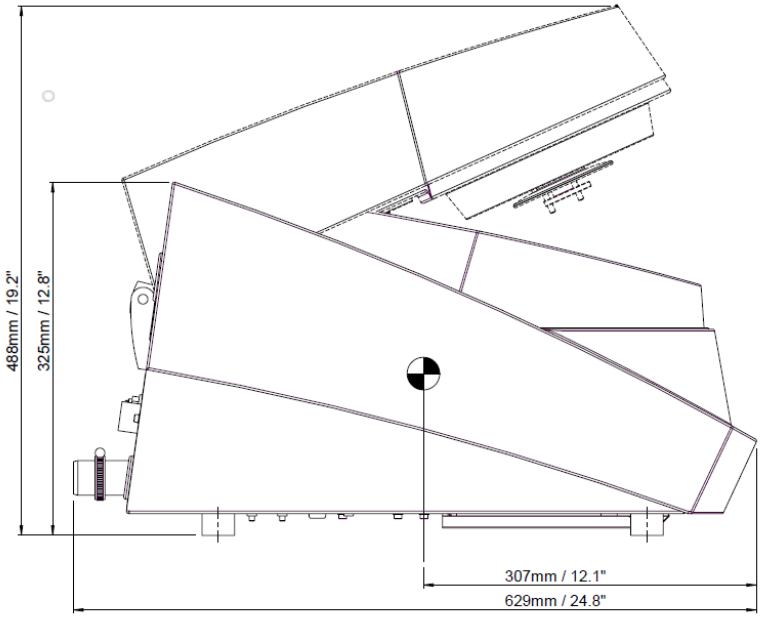


Centre of Gravity

FRONT

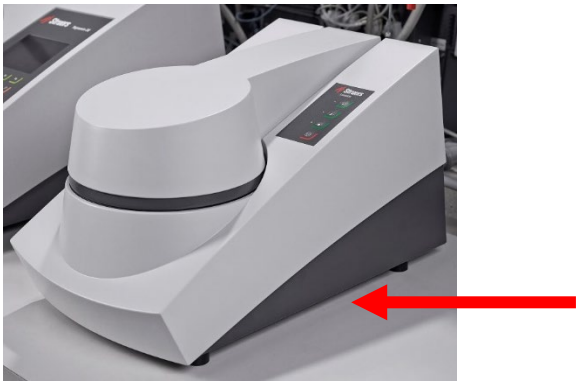


SIDE



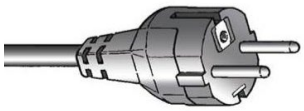
Lifting

NOTE:
Do not lift Lavamin using the lid.
Always lift from underneath the machine.



Power Supply

The machine shipped with 2 types of Mains cables (length 2.5 m/ 8.2').



The 2-pin (European Schuko) plug is for use on single-phase connections.
If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug.

The 3-pin (North American NEMA 6-15P) plug is for use on 2-phase connections.
If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug.

Electrical data

Voltage / frequency	200 - 240 V 50-60Hz	100 - 120V 50-60Hz
Power inlet	1-phase (N+L1+PE) or 2-phase (L1+L2+PE)	
Power consumption: Idle Max	 2.5 W 140 W @ 200-240V	 2.5 W 140 W @100-120V
Current	0.7 A @ 200-240V	1.2 A @100-120V

Safety Specifications

Safety Circuit Categories

	Designed to comply with a minimum of
Rotation of specimen mover holder	EN 60204-1, Stop Category 0 EN ISO 13849-1, Cat. 3, PL d
Down movement of hood	EN 60204-1, Stop Category 0 EN ISO 13849-1, Cat. 1, PL c

Water Supply ☑ Required ☐ Option

Water may be supplied from the water mains.
Lavamin can be connected to the same water supply as e.g. Tegramin by using the Y-connector supplied

Water pressure: 1.8 - 9.9 bar / 26 – 143 psi.

Water supply capacity: min. 6 l/min

Water consumption: approx. 4.2 - 4.5 l/per cycle (all cleaning programs)

Hose supplied: ¾” water inlet hose x 2 m / 6.5’ with standard connector, filter gasket and reduction ring ¾" to ½"

Connection ¾" British Standard pipe thread

Water outlet – Drain ☑ Required ☐ Option

The machine is supplied with a 1.5 m / 5' outlet hose.
Ensure that the water outlet drain is below the level of the machine.

Compressed air ☑ Required ☐ Option

Lavamin can be connected to a standard 1/8" compressed air supply with the connection piece supplied.
If only one compressed air outlet is available, the air supply can be split before entering the Tegramin by using the T-connection piece supplied.

Pressure: 4.5 - 7 bar / 65 - 101 psi.

Air Flow: Cleaning program 1 + 2: 50 l/min
Cleaning program 3: 200 l/min

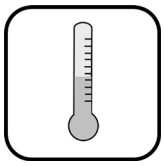
Air consumption: Cleaning program 1 + 2: approx. 1 l per cleaning cycle
Cleaning program 3: approx. 100 l per cleaning cycle (@200 l/min)

Recommended quality: Class-3, as specified in ISO 8573-1.

Exhaust ☐ Required ☐ Option

Not required.

Ambient Conditions



5 - 40 ˚C
41 - 104 °F

35 - 85 % RH non condensing

Accessories & Consumables

Lavamin is to be used with specimen holders up to 160 mm dia. with a max. total weight of 2.5 kg (5.5 lb) and for specimen mover plates from Tegramin-25 /-30 and TegraForce-5 and RotoForce-4 up to 165 mm dia. Specimen mover plates with a thickness of 4 mm are recommended.

Struers
Ensuring Certainty

Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark

Declaration of Conformity

EU / UE / EL / EC / EE / ES / EÚ / AB

Manufacturer / Производител / Výrobce / Producent / Hersteller / Κατασκευαστής / Fabricante / Tootja / Valmistaja / Fabricant / Proizvođač / Gyártó / Fabbricante / Gamintojas / Ražotājs / Fabrikant / Producent / Fabricante / Producătorul / Výrobca / Proizvajalec / Tillverkare / 販売元 / 제조사 / Produsent / Изготовитель / İmalatçı / 制造商

Doc. 16237901C
16237901

Декларация за съответствие
Prohlášení o shodě
Overensstemmelseserklæring
Konformitätserklärung
Δήλωση συμμόρφωσης
Declaración de conformidad
Vastavusdeklaratsioon
Vaatimustenmukaisuusvakuutus
Déclaration de conformité
Izjava o sukladnosti
Megfelelőségi nyilatkozat
Dichiarazione di conformità
Atitikties deklaracija
Atbilstības deklarācija
Verklaring van overeenstemming
Deklaracja zgodności
Declaração de conformidade
Declarație de conformitate
Vyhlásenie o zhode
Izjava o skladnosti
Intyg om överensstämmelse
適合宣言書
적합성 선언서
Samsvarserklæring
Заявление о соответствии
Uygunluk Beyanı
符合性声明

Name / Име / Název / Navn / Name / Όνομα / Nombre / Nimetus / Nimi / Nom / Naziv / Név / Nome / Pavadinimas / Nosaukums / Naam / Nazwa / Nome / Denumirea / Názov / Ime / Namn / 名前 / 제품명 / Наименование / Adı / 名称

Lavamin

Model / Модел / Model / Model / Modell / Μοντέλο / Modelo / Mudel / Malli / Modèle / Model / Modell / Modello / Modelis / Modelis / Model / Model / Modelo / Modelul / Model / Model / Modell / モデル / 모델 / Modell / Модель / Model / 型号

Lavamin

Function / Функция / Funkce / Funktion / Funktion / Λειτουργία / Función / Funktsioon / Toiminto / Fonction / Funkcija / Funkció / Funzione / Funkcija / Funkcija / Functie / Funkcja / Função / Funcția / Funkcia / Funkcija / Funktion / 機能 / 기능 / Funksjon / Назначение / Fonksiyon / 功能

Specimen cleaning machine

Type / Тип / Typ / Type / Typ / Τύπος / Tipo / Tüüp / Tyyppi / Type / Tip / Típus / Tipo / Tipas / Tips / Type / Typ / Tipo / Tipul / Typ / Tip / Typ / 種類 / 유형 / Type / Тип / Tür / 类型

06236233

Serial no. / Сериен номер / Výrobní číslo / Serienummer / Seriennummer / Σειριακός αριθμός / N.º de serie / Seerianumber / Sarjanro / No de série / Serijski broj / Sorozatszám / N. seriale / Serijos Nr. / Sērijas Nr. / Serienr. / Numer seryjny / N.º de série / Nr. serie / Výrobné č. / Serijska št. / Serienummer / シリアル番号 / 일련번호 / Serienr. / Серийный номер / Seri no. / 序列号

CE

Module H, according to global approach

EN **We declare that the product mentioned is in conformity with the following directives and standards:**
BG Декларираме, че посоченият продукт е в съответствие със следните директиви и стандарти:
CZ Tímto prohlašujeme, že uvedený výrobek je v souladu s následujícími směrnicemi a normami:
DK Vi erklærer herved, at det nævnte produkt er i overensstemmelse med følgende direktiver og standarder:
DE Wir erklären, dass das genannte Produkt den folgenden Richtlinien und Normen entspricht:
EL Δηλώνουμε ότι το εν λόγω προϊόν είναι σύμφωνο με τις ακόλουθες οδηγίες και πρότυπα:
ES Declaramos que el producto mencionado cumple con las siguientes directivas y normativas:
ET Kinnitame, et nimetatud toode vastab järgmistele direktiividele ja standarditele:
FI Vakuutamme, että mainuttu tuote on seuraavien direktiivien ja standardien mukainen:
FR Nous déclarons que le produit mentionné est conforme aux directives et normes suivantes :
HR Izjavljujemo da je spomenuti proizvod sukladan sljedećim direktivama i standardima:
HU Kijelentjük, hogy jelen termék megfelel a következő irányelveknek és szabványoknak:
IT Dichiariamo che il prodotto citato è conforme ai seguenti standard e direttive:
LT Pareiškiame, kad nurodytas gaminys atitinka šias direktyvas ir standartus:
LV Mēs apstiprinām, ka minētais produkts atbilst šādām direktīvām un standartiem:
NL Wij verklaren dat het vermelde product in overeenstemming is met de volgende richtlijnen en normen:
PL Oświadczamy, że wymieniony produkt jest zgodny z następującymi dyrektywami i normami:
PT Declaramos que o produto mencionado está em conformidade com as seguintes normas e diretivas:
RO Declarăm că produsul menționat este în conformitate cu următoarele directive și standarde:
SK Vyhlasujeme, že uvedený výrobok je v súlade s týmito smernicami a normami:
SL Potrjujemo, da je omenjeni izdelek v skladu z naslednjimi direktivami in standardi:
SV Vi intygar att den angivna produkten överensstämmer med följande direktiv och standarder:
JA 弊社はこの指定製品が以下の指令および基準に適合することを宣言します。
KO 해당 선언서 상의 제품은 다음 지침 및 기준에 적합함을 선언합니다.
NO Vi erklærer at produktene som er nevnt er i samsvar med følgende direktiver og standarder:
RU Настоящим заявляем, что указанная продукция отвечает требованиям перечисленных далее директив и стандартов:
TR Belirtilen ürünün aşağıdaki direktiflere ve standartlara uygun olduğunu beyan ederiz:
ZH 我们特此声明上述产品符合以下指令和标准：

2006/42/EC	EN ISO-11202:2010, EN ISO-12100:2010, EN ISO-13849-1:2015, EN ISO-13849-2:2012, EN ISO-14119:2013, EN ISO-14120:2015.
2014/30/EU	EN-60204-1:2006/A1:2009/Cor:2010, EN-61000-3-2:2014, EN-61000-3-3:2013, EN-61000-6-1:2007, EN-61000-6-3:2007/A1:2011.
2011/65/EU	EN-50581:2012.
Additional standards	NPFA 79, FCC 47, CFR part 15 subpart B.

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