Struers
Ensuring Certainty

Lavamin

Instruction Manual

Original Instructions

CE

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1 About this manual

CAUTION
Struers equipment must only be used in connection with and as described in the Instruction Manual supplied with the equipment.

Note
Read the Instruction Manual carefully before use.

Note
If you want to view specific information in detail, see the online version of this manual.

2 Safety

2.1 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).

The machine is designed to be used only with Struers consumables specifically designed for this purpose and this type of machine.

Do not use the machine for the following	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.
Model	Lavamin

2.2 Lavamin safety precautions

2.2.1  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 must read the safety precautions and Instruction Manual, as well as relevant sections of the manuals for any connected equipment and accessories.
4. This machine must be operated and maintained only by skilled/trained personnel.
5. The machine must be placed on a safe and stable table with an adequate working height.
6. Use only water as the cleaning medium.
7. Stay clear of the lid while it is closing. Once the lid is closed, do not force it open.
8. Make sure that all retention rings are placed correctly on the specimens both before and after each cleaning step.
9. Never use a specimen mover plate for specimens with a small diameter and low density, as they can float out of the specimen mover plate and be damaged or cause damage to the bowl during spinning. Always clamp small specimens with a small diameter or low density in a specimen holder instead.
10. In case of power or air failure, the lid will close. Keep your hands off the machine to avoid crushing your fingers.
11. Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the name plate of the machine. The machine must be earthed (grounded). Always follow local regulations. Always switch off the electrical power supply and remove the plug or power cable before dismantling the machine or installing additional components.
12. When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts. Appropriate safety clothing must be used.
13. If you observe malfunctions or hear unusual noises, switch off the machine and call technical service.
14. The machine must be disconnected from the electrical power supply before any service. Wait 5 minutes until residual potential on the capacitors is discharged.
15. Do not switch the machine on and off more than once every five minutes. Damage to the electrical components could occur.
16. In case of fire, alert bystanders and the fire brigade. Use a powder fire extinguisher. Do not use water.
17. Struers equipment must only be used in connection with and as described in the Instruction Manual supplied with the equipment.
18. If the equipment is subjected to misuse, incorrect installation, alteration, neglect, accident or incorrect repair, Struers will accept no responsibility for damage to the user or the equipment.

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

2.3 Safety messages

Struers uses the following signs to indicate potential hazards.

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

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

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

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

General messages

Note
This sign indicates that there is a risk of damage to property, or a need to proceed with special care.

Hint
This sign indicates that additional information and hints are available.

2.4 Safety messages in this manual

Specific safety precautions - residual risks

WARNING
The machine must not be used for any type of explosive and/or flammable material, or materials which are not stable during machining, heating or pressure.

CAUTION
Make sure that the water connections are correctly mounted and without leaks.

CAUTION
This machine must be operated and maintained only by skilled/trained personnel.

CAUTION
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.

General safety precautions

WARNING
Struers equipment must only be used in connection with and as described in the Instruction Manual supplied with the equipment.

ELECTRICAL HAZARD
Switch off the electrical power supply before installing electrical equipment.
The machine must be earthed (grounded).
Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the name plate of the machine.
Incorrect voltage can damage the electrical circuit.

WARNING
Switch off the machine, disconnect the electrical power cable and wait 5 minutes before you dismantle the machine or install additional components.

WARNING
Do not use the machine with defective safety devices.
Contact Struers Service.

WARNING
Safety critical components must be replaced after a maximum lifetime of 20 years.
Contact Struers Service.

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

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

3 Get started

3.1 Device description

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

Lavamin is designed for standard specimen holders up to 160 mm (6.3") diameter with a max total weight of 2.5 kg (5.5 lb) and for specimen mover plates up to 165 mm (6.5") diameter.

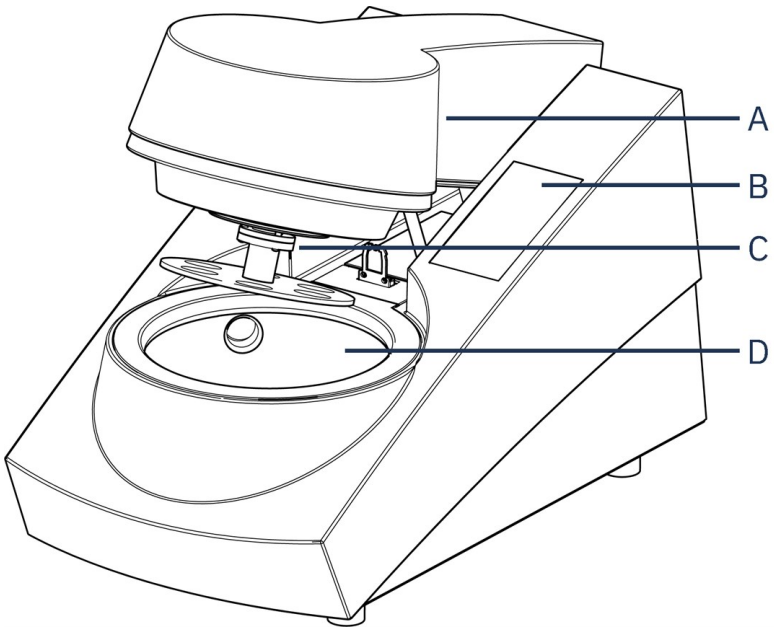
Small and light specimens placed in a specimen mover plate must be held in place during cleaning by a rubber mat.

The cleaning process starts by the operator inserting the balanced specimen holder or mover plate into the unit.

The unit is closed by pressing one of the cleaning program buttons. 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.

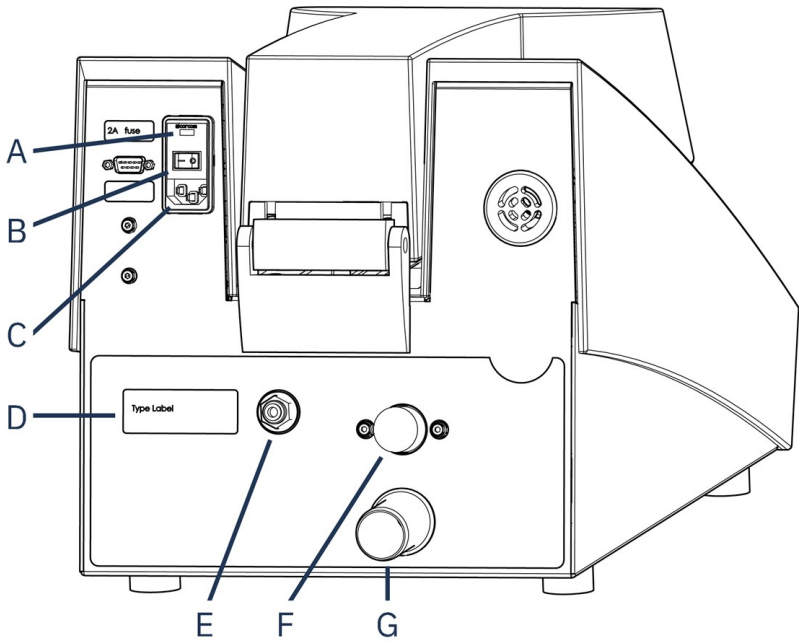
3.2 Overview

Front view



A	Lid	**C**	Coupling flange
B	Control panel	**D**	Bowl

Rear view



A	Fuse	**E**	Compressed air inlet
B	Main switch	**F**	Water inlet
C	Power supply	**G**	Water outlet
D	Name plate		

3.3 Accessories

Accessories

For information about the available range, see the Lavamin brochure:

- The Struers Website (http://www.struers.com)

4 Transport and storage

If, at any time after the installation, you have to move the unit or place it in storage, there is a number of guidelines we recommend that you follow.

- Package the unit securely before transportation. Insufficient packaging could cause damage to the unit and will void the warranty. Contact Struers Service.
- We recommend that you use the original packaging and fittings.

4.1 Storage

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

Note
We recommend that you keep all original packaging and fittings for future use.

1. Disconnect the machine from the electrical power supply, water supply and compressed air supply.
2. Check that there is no specimen holder or mover plate in the machine.
3. Clean and dry the unit before storage.
4. Place the machine and accessories in their original packaging.

Note
If the machine is not to be used for a longer period of time, wrap the machine in plastic along with silica gel.

4.2 Transport

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

Note
We recommend that you keep all original packaging and fittings for future use.

To transport the machine safely, follow these instructions.

Preparing for transport

1. Disconnect the unit from the electrical power supply.
2. Remove any accessories.
3. Clean and dry the unit.

5 Installation

5.1 Unpack the machine

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

Note
We recommend that you keep all original packaging and fittings for future use.

1. Cut the packing tape on the top of the box.
2. Fold out the side of the box (see the illustration).
3. Remove the loose parts.
4. Remove the unit from the box.

5.2 Lift the machine

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

Note
Always lift the machine from beneath.

Weight	
Lavamin	17 kg (37.5 lbs)

At the new location

1. Place the machine on a rigid, stable workbench with a horizontal surface and an adequate height.
2. Make sure that the unit is level and rests securely on the workbench.

5.3 Check the packing list

Optional accessories may be included in the packing box.

The packing box contains the following items:

Pcs.	Description
1	Lavamin
1	Connection piece: p6 to 1/8" (to connect the machine to a standard 1/8" compressed air supply)
1	Connection piece (to connect to a Tegramin air outlet)
1	Water inlet hose: 19 mm/ ¾" - 2.5 m (8.2 ft)
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", 1.5 m (5') diameter
2	Hose clamp: 25 - 40 mm (1" - 1.5") diameter
1	Hose clamp: 11 mm (0.4") diameter
2	Power supply cables
1	Set of retention rings for single specimens. 15 pieces of each size: – Diameter: 25 mm (1") – Diameter: 30 mm (1.25") – Diameter 40 mm (1.5") – Diameter: 50 mm (2")
1	Leveling tool (for single specimens)
2	Rubber mat (for light specimens in specimen mover plates)
1	Grate plate set – 1 Grate plate – 2 Rubber feet – 1 Instructions for use
1	Instruction Manual set

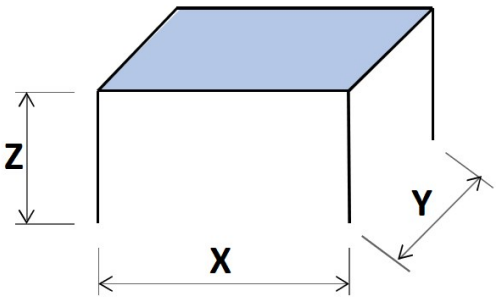
5.4 Location

CRUSHING HAZARD
Take care of your fingers when handling the machine.
Wear safety shoes when handling heavy machinery.

- Make sure that the following facilities are available:
  - Power supply

- Water supply
- Compressed air supply

Recommended workbench dimensions	
Z	Recommended: 80 cm (31.5")
X	70 cm (27.6")
Y	80 cm (31.5")



- Place the machine on a rigid, stable workbench with a horizontal surface and an adequate height.
- The machine must rest securely with all 4 feet on the table.
- To facilitate easy access for service technicians, allow sufficient space around the machine.
- Make sure that there is enough room in front of the machine: 100 cm (40").

Illumination

Illumination: Make sure that the machine is adequately lit up. A minimum of 300 Lumen is recommended to illuminate the controls and other work areas.

Ambient conditions		
Operating environment	Surrounding temperature	5 - 40°C (40 - 105°F)
	Humidity	35 - 85% RH non-condensing

5.5 Power supply

WARNING
Switch off the machine, disconnect the electrical power cable and wait 5 minutes before you dismantle the machine or install additional components.

ELECTRICAL HAZARD
Switch off the electrical power supply before installing electrical equipment.
The machine must be earthed (grounded).
Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the name plate of the machine.
Incorrect voltage can damage the electrical circuit.

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

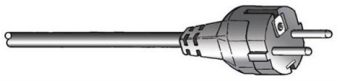
Power socket

The electrical power supply socket must be easy to access. The electrical power supply socket must be located at a height ranging from 0.6 m to 1.9 m/2½” to 6’ above floor level. Not higher than 1.7 m/5’ 6” is recommended.

Note
The equipment is shipped with 2 types of electrical power cables. If the plug supplied on these cables is not approved in your country, the plug must be replaced with an approved plug.

Single-phase supply

The 2-pin plug (European Schuko) is for use on single-phase electrical power connections.



The leads must be connected as follows:

Yellow/Green	Earth (ground)
Black/Brown	Line (live)
Blue	Neutral

2-phase supply

The 3-pin plug (North American NEMA) is for use on 2-phase electrical power connections.

The leads must be connected as follows:

Green	Earth (ground)
Black	Line (live)
White	Line (live)

Residual Current Circuit Breaker (RCCB)

Note
Local standards can override the recommendations for the main electrical power supply cable.Always contact a qualified electrician to verify which option is suitable for the local installation setup.

Residual Current Circuit Breaker (RCCB)	Type A, 30 mA (or better) is recommended

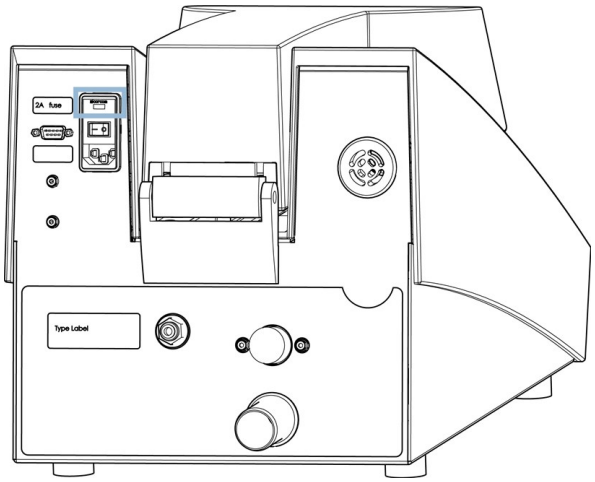
Power the machine

ELECTRICAL HAZARD
Switch off the electrical power supply before installing electrical equipment.
The machine must be earthed (grounded).
Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the name plate of the machine.
Make sure that the fuse is set to the correct voltage setting.
Incorrect voltage can damage the electrical circuit.

1. Connect the electrical power cable to the machine (IEC 60320 connector).
2. Connect the other end of the cable to the electrical power supply socket.

Note
In countries with a 100 - 120 V electrical power supply, you must change the setting of the equipment.
- 115 V: 100 - 120 V/50/60 Hz
- 230 V: 200 - 240 V/50/60 Hz (factory setting)

How to change the voltage



1. Use a small, flat-tip screwdriver to open the cover of the fuse compartment at the back of the control unit.
2. Take the fuse holder out of the fuse compartment.

3. Turn the fuse holder into the required position.
4. Push it back into the fuse compartment.
5. Close the cover of the fuse compartment. The "window" should now show the correct voltage.

5.6 Water supply

CAUTION
Make sure that the water connections are correctly mounted and without leaks.

Note
New water pipe installations:
Let the water run for a few minutes to flush any debris from the pipe before you connect the machine to the water supply.

Hint
The machine can be connected to the same water supply as e.g. Tegramin by using the Y-connector supplied.

Technical specifications	
Water pressure	1.8 - 9.9 bar (14.5 - 143 psi)
Water supply capacity	min. 6 L/min (1.6 gpm)
Water consumption	approximately 4.2 - 4.5 L (1 gal) per cycle (all cleaning programs)

Mount the 90° end of the inlet hose onto the water inlet on the back of the machine:

1. Insert the filter gasket in the coupling nut with the flat side against the pressure hose.
2. Tighten the coupling nut completely.

Water inlet

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

Water outlet - drain

CAUTION
Make sure that the water connections are correctly mounted and without leaks.

1. Mount the outlet hose onto the water outlet pipe. (Lubricate with grease or soap to facilitate insertion.) Use a hose clamp for fastening.
2. Lead the other end of the drain hose to the water outlet. Shorten the hose, if necessary.

Note
Make sure that the waste water hose slopes downwards towards the waste water drain throughout its length.

5.7 Compressed air supply

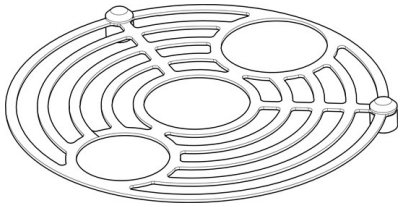
Compressed air specifications	
Pressure	4.5 - 7 bar (65 - 101 psi)
Air consumption, approx.	200 L/min (53 gpm)
Air quality	Class-3, as specified in ISO 8573-1

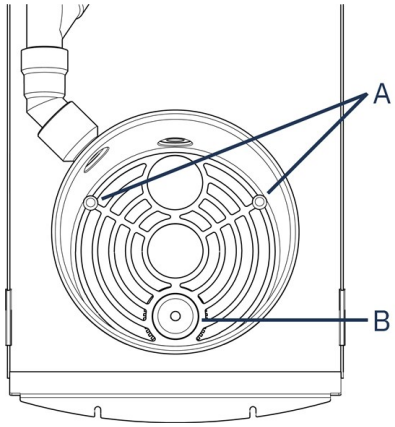
To connect compressed air

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

5.8 Insert 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.





A Feet **B** Water divider

1. Place the grate plate in the bowl horizontally.
2. The long section of the feet must be placed downwards.
3. Fit the smaller hole over the water divider.

5.9 Noise

For information on the sound pressure level value, see this section: Technical data ►29

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

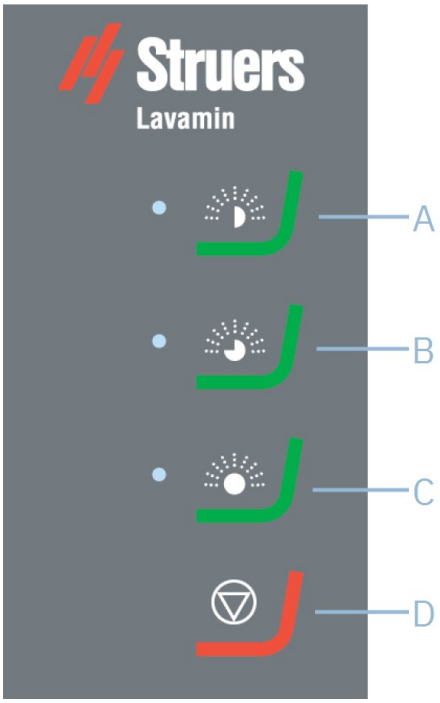
5.10 Vibration

For information on the total vibration exposure to hand and arm, see this section:Technical data ►29.

6 Operate the device

6.1 Basic operation

6.1.1 Control panel functions



A	Cleaning program 1	**C**	Cleaning program 3
B	Cleaning program 2	**D**	Stop

6.1.2 Cleaning programs

The Lavamin has three cleaning programs:

Cleaning program 1

- For cleaning and drying in-between preparation steps.
- Approximately 1 min.
- No air flushing, residual humidity can occur.

Cleaning program 2

- For cleaning and drying of dirty specimens.
- Approximately 1½ min.
- No air flushing, residual humidity can occur.

Cleaning program 3

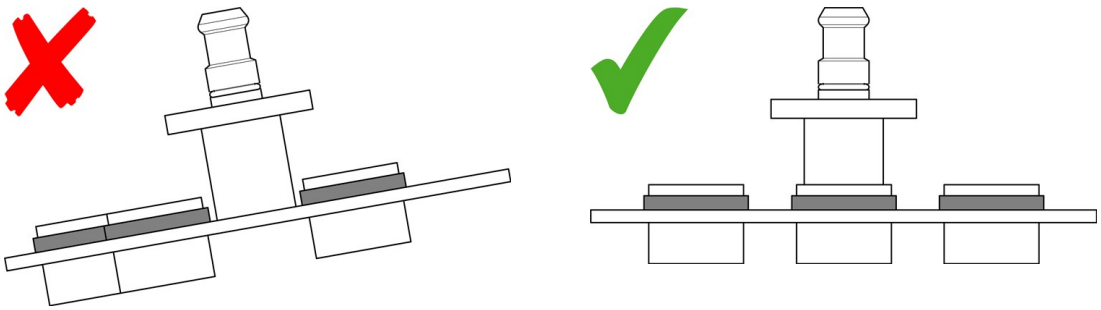
- For final cleaning and drying of specimens.
- Approximately 2 min.
- With air flushing, no residual humidity.

6.1.3 Clamp and level specimens

CAUTION
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.

The specimens must be evenly distributed in the specimen holder or specimen mover plate so it is balanced. The specimens should have approximately the same size and weight.

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



6.1.4 Specimen holder

If you use a Uniforce leveling device, refer to the instructions in the specimen holders user guide.

6.1.5 Specimen mover plate

CAUTION
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.

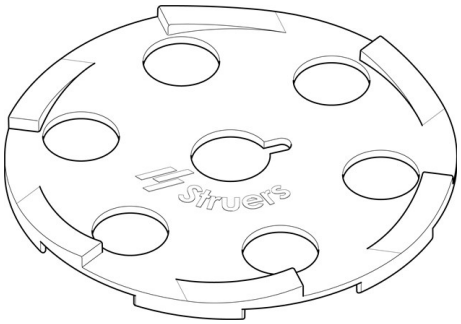
Fit individual specimens with a retention ring and make sure they are suspended from the specimen mover plate.

Note
Use specimen mover plates of 4 mm (0.16") thickness. If you use specimen mover plates of 2 mm (0.08"), the holes must fit the diameter of the specimens, otherwise the specimens can be flung out of the mover plate during spinning.

Specimen weight and 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 can result in damage to the bowl or the specimens.

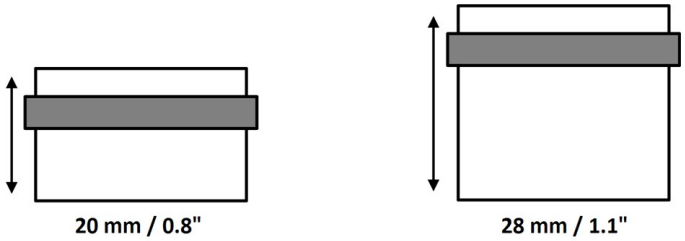
Use a rubber mat to keep small and light specimens in place.



1. Select the rubber mat that fits the size of the specimen mover plate. You can use 140 or 160 mm (5.5" or 6.3") mover plates.
2. Place the mat on the specimen mover plate and check that the holes (for the pressure feet) are directly over the specimens.
3. Leave the mat in place during preparation.

Specimen height

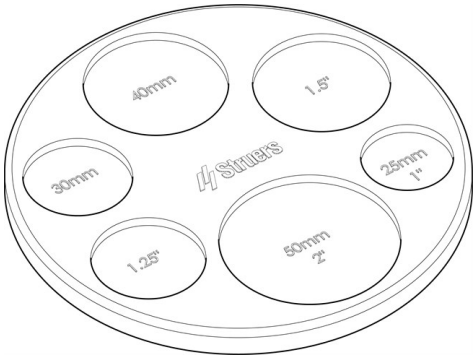
We recommend that you use specimens between 20 - 28 mm (0.8 - 1.1").



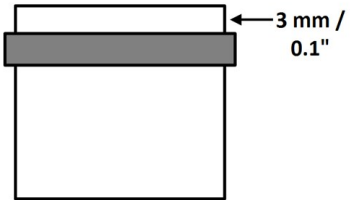
Fitting a retention ring

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

Fit the retention rings using the leveling tool supplied or an applicator (optional accessory).



1. Place the specimen in the leveling tool with the face to be prepared downwards.
2. Slide the retention ring over the specimen and push a few millimeters down the side of the specimen.
3. Turn the specimen upside down and place in the correct aperture of the leveling tool.

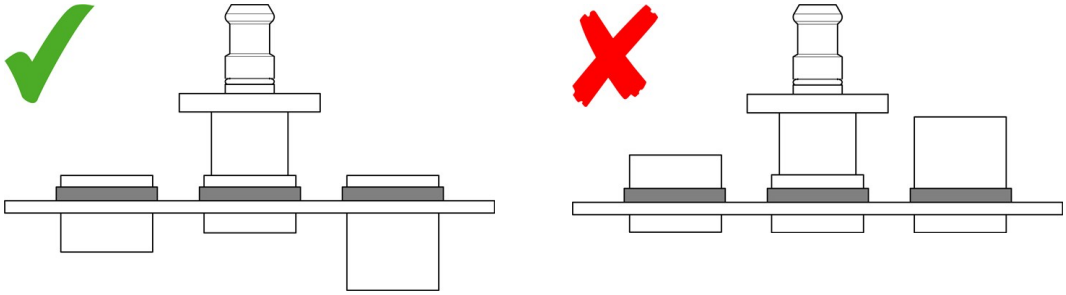


4. Press the retention ring down until it rests on the surface of the leveling tool. The back of the specimen should protrude 3 mm (0.1") through the retention ring.

For specimens between 28 - 32 mm (1.1 - 1.3"):

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

Note
Always place the retention rings on top of the specimens, otherwise the specimens can fall off the specimen mover plate 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.

Applicator for retention rings (optional)

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

Note
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.

6.1.6 Cleaning specimens

WARNING
The machine must not be used for any type of explosive and/or flammable material, or materials which are not stable during machining, heating or pressure.

CAUTION
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.

Placing the specimen holder or specimen mover plate

1. Press the coupling flange downwards and insert the specimen holder or specimen mover plate.
2. Rotate the specimen holder or specimen mover plate until the three pins from the coupling engage in the corresponding holes of the specimen holder or specimen mover plate.
3. Release the flange. Check that the specimen holder or specimen mover plate is securely fixed in the coupling.

Hint
Hold the specimen holder or specimen mover plate with one hand. Use the other hand to operate the coupling.

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 you can remove the specimen holder or specimen mover plate.

7 Maintenance and service

Proper maintenance is required to achieve the maximum up-time and operating lifetime of the machine. Maintenance is important in ensuring continued safe operation of your machine.

The maintenance procedures described in this section must be carried out by skilled or trained personnel.

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

For specific safety related parts, see the section "Safety Related Parts of the Control System (SRP/CS)" in the section "Technical data" in this manual.

Technical questions and spare parts

If you have technical questions or when you order spare parts, state serial number and voltage/frequency. The serial number and the voltage are stated on the name plate of the machine.

7.1 Daily

7.1.1 General cleaning

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 cannot be removed completely.

- Wipe the bowl with a damp cloth.

Note
Do not clean the bowl with compressed air. Pressurized air can damage the water level sensor.

Note
Do not use alcohol, acetone or similar solvents.

7.2 Weekly

7.2.1 General cleaning

- Wipe the surface of the machine with a damp cloth and common household detergents.
- Clean the bowl with a household scouring pad. Do not use a metal scourer.
- Check the water and air connections.

Note
Do not clean the bowl with compressed air. Pressurized air can damage the water level sensor.

Note
Do not use alcohol, acetone or similar solvents.

7.3 Annually

7.3.1 Test the safety devices

WARNING
Do not use the machine with defective safety devices.
Contact Struers Service.

Note
Testing should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).

Lid safety switch system

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

1. Close the lid.
2. Start a cleaning program. The machine starts operating.
3. Try to open the lid. Do not use force. If the lid can be opened and the motor is rotating, press Stop. Contact Struers Service.
4. Start a cleaning program with open lid.
5. If the motor starts rotating, press Stop. Contact Struers Service.
6. Check the safety-catch for correct function. The safety-catch must slide unobstructed into the locking mechanism. If this is not the case, contact Struers Service.

7.4 Spare parts

For specific safety related parts, see the section "Safety Related Parts of the Control System (SRP/CS)" in the section "Technical data" in this manual.

Technical questions and spare parts

If you have technical questions or when you order spare parts, state the serial number and the year of production. This information is stated in the name plate on the machine.

For further information, or to check the availability of spare parts, contact Struers Service. Contact information is available on Struers.com.

7.5 Service and repair

We recommend that a regular service check be carried out yearly or after every 1500 hours of use.

When the machine is started up, the display shows information about total operation time and the machines service information.

After 1500 hours of operation time, the display will show a message reminding the user that a service check should be scheduled.

Note
Service must only be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).
Contact Struers Service.

8 Disposal

Equipment marked with a WEEE symbol contains electrical and electronic components and must not be disposed of as general waste.

Contact your local authorities for information on the correct method of disposal in accordance with national legislation.

For disposal of consumables and recirculation fluid, follow local regulations.

9 Troubleshooting

9.1 LED error signals

LED signal	Explanation	Action required
	Vibrations are too high.	Check that the specimen holder is balanced.
	Water inlet error.	Check the water supply.
	Water drainage error.	Check if the water drain is blocked.
	No air pressure.	Check the air supply.

LED signal	Explanation	Action required
	The specimen holder is blocked.	Check for obstructions. Check that the specimen holder is balanced.
	The lid is not down after the process starts (15 second timeout)	Check for obstructions.
	System error.	Press a cleaning program key to show the system error number. Contact Struers Service.

- 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.

For example:

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 the machine off at the main switch.

10 Technical data

10.1 Technical data

Software and electronics	Keyboard panel	with status LEDs
Safety standards/directives/legislation		See the Declaration of Conformity/Instruction manual.
REACH		For information about REACH, contact your local Struers office.
Operating environment	Surrounding temperature	–
	During operation	5 - 40°C (41 - 104°F)
	During transport	0°C - 60°C (32 - 140°F) (transport) < 90% RH non-condensing
	Humidity	35 - 85 % RH non-condensing
Water supply (tap water)	Pressure	1.8 - 9.9 bar (26 - 143 psi)
	Flow	Min. 6 L/min (2.3 gmp)
	Water inlet, connection	3/4"
Waste water outlet	Diameter	32 mm (1.25")
	Max. distance to drain	600 cm
	Slope	Min. 8%
Compressed air supply	Pressure	4.5 - 7 bar (65 - 101 psi)
	Flow	200 L/min (53 gpm)
	Recommended quality	Class-3, as specified in ISO 8573-1

Power supply	Voltage/frequency	200 - 240 V (50/60Hz) 100 - 120 V (50/60Hz)
	Power inlet	1-phase (N+L1+PE) or 2-phase (L1+L2+PE)
	Power	–
	Nominal load	140 W
	Idle	2.5 W
	Current	–
	Nominal	0.7 A 1.2 A
	Max.	1.1 A 1.5 A
	Current, largest load	0.55 A 1.1 A
Exhaust	Diameter	28 mm (1.1")
	Recommended capacity	not required
Dimensions and weight	Width	32 cm (12.6")
	Depth	63 cm (24.8")
	Height Height (with open cover)	33 cm (13") 50 cm (19.7")
	Weight	17 kg (37.5 lbs)
	Capacity	1.7 L (0.45 gal)
Safety Circuit Categories/Performance Level	Rotation of specimen mover holder	PL d Stop category 0
	Down movement of hood	PL c Stop category 0
Noise level	A-weighted sound emission pressure level at workstations	LpA = 57.9 dB(A) (measured value)
Vibration level	Declared vibration emission	N/A

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

WARNING
Safety critical components must be replaced after a maximum lifetime of 20 years.
Contact Struers Service.

Note
SRP/CS (safety-related parts of a control system) are parts that have an influence on safe operation of the machine.

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

Parts

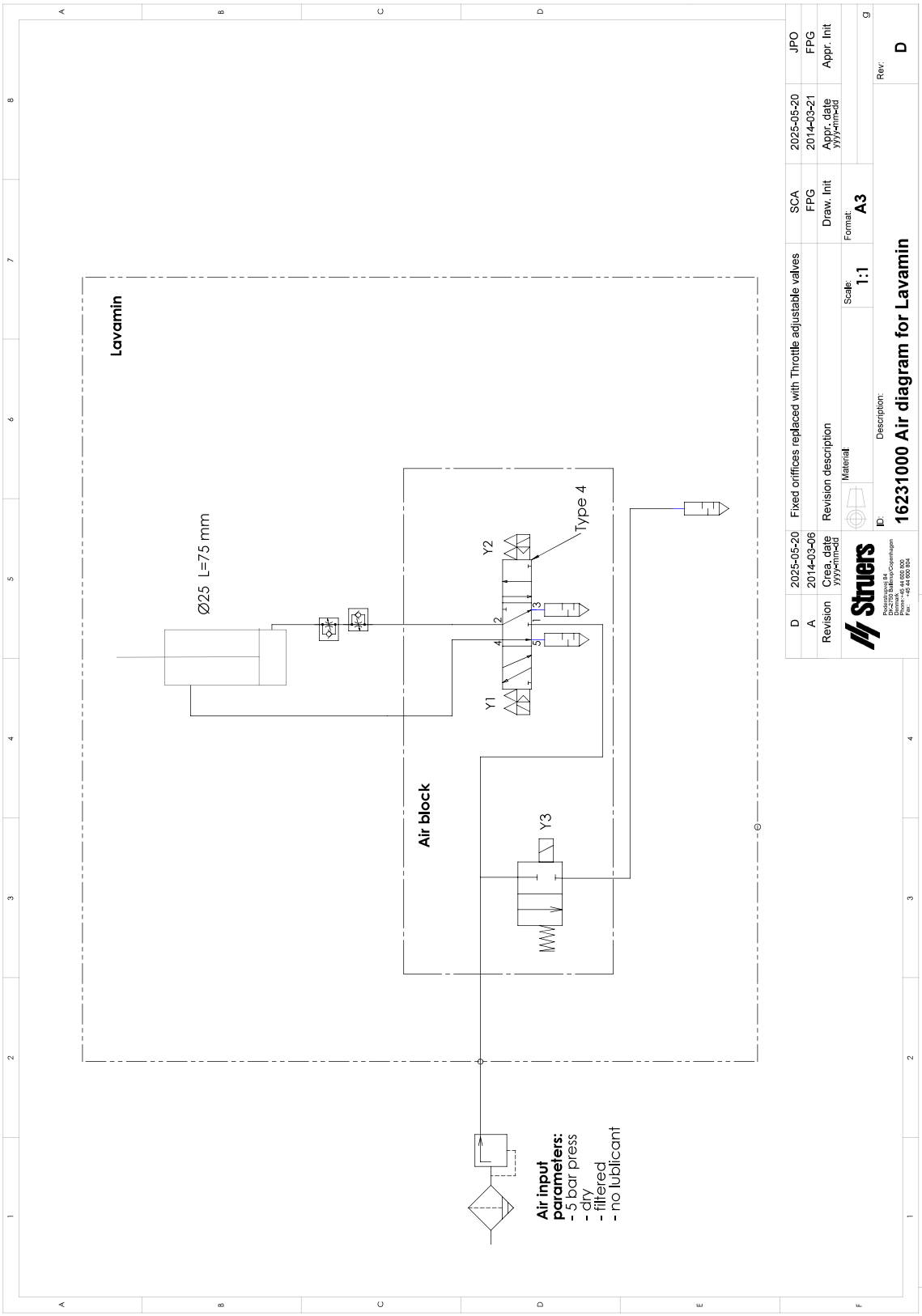
Safety related part	Manufacturer/Manufacturer description	Manufacturer catalog no.	Electrical ref.	Struers catalog no.
Safety relay	Omron Safety relay unit	G9SB-3012-A	KS1	2KS10006
Interlock magnetic sensor	Schmersal Safety sensor	BNS 120-02Z	SS1	2SS00130
Interlock magnetic actuator	Schmersal Safety 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

10.3 Diagrams

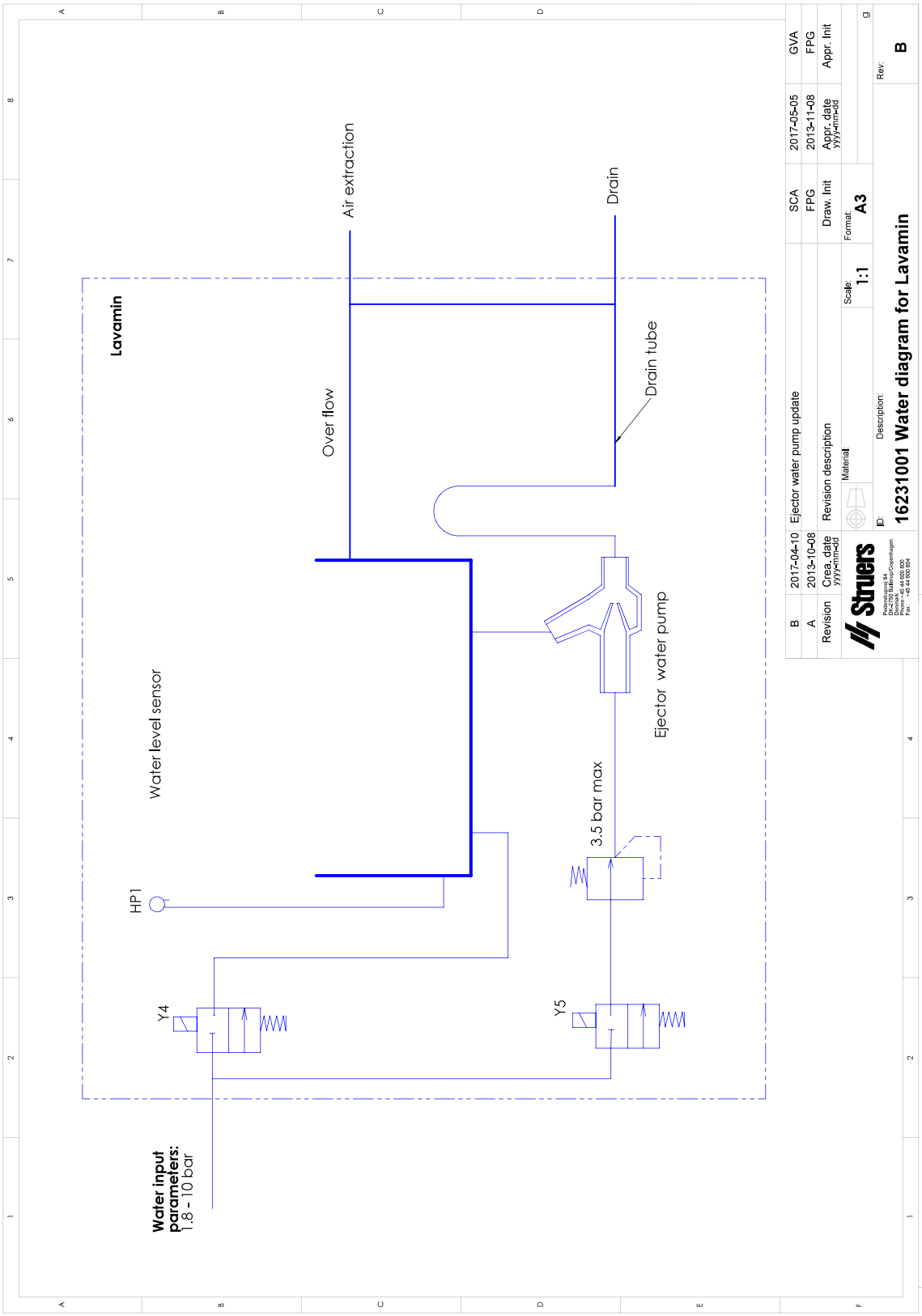
If you want to view specific information in detail, see the online version of this manual.

Title	No.
Air diagram	16231000 ►33
Water diagram	16231001 ►34
Block diagram	16233051 ►35

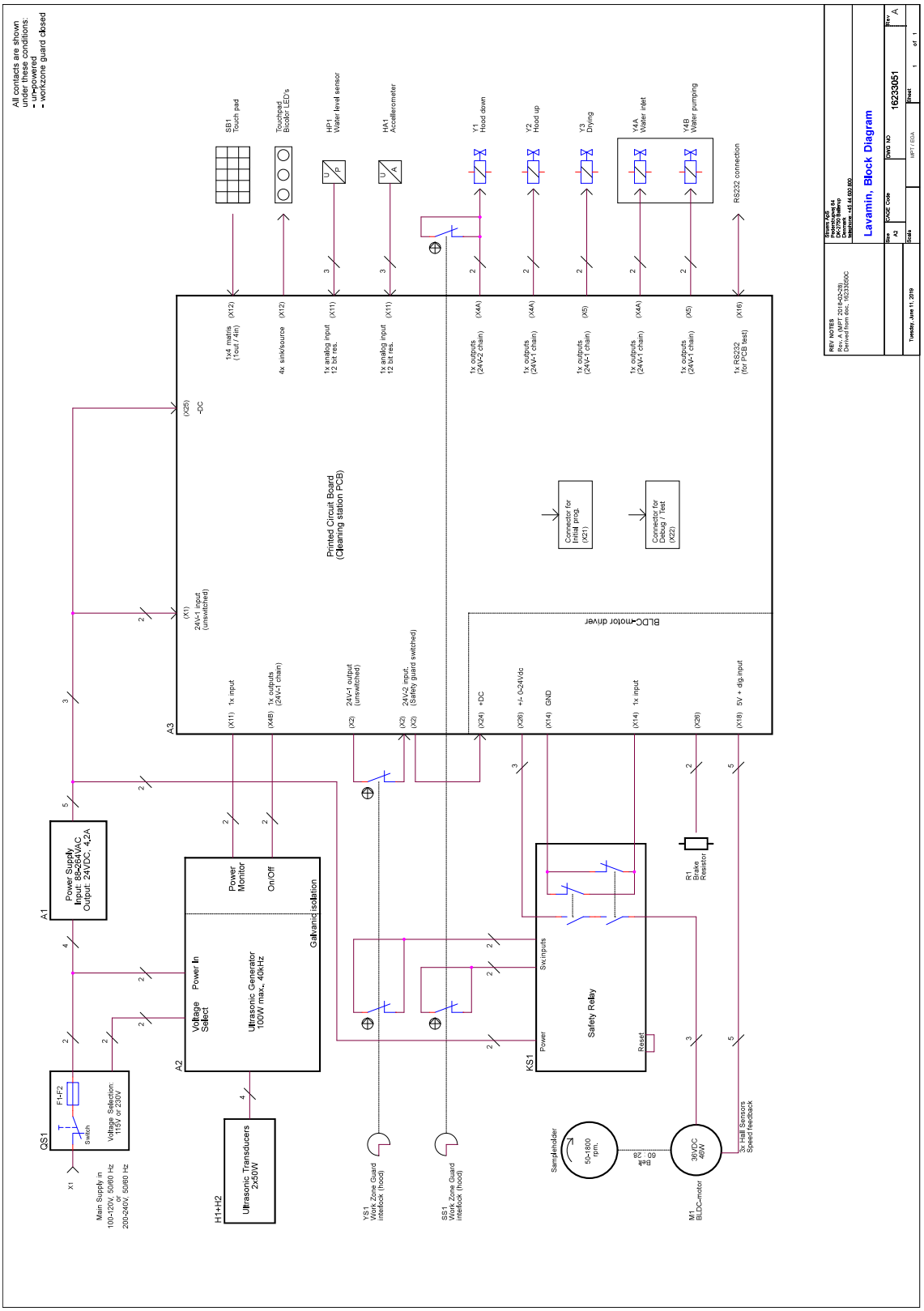
16231000


Lavamin
Ø25 L=75 mm
Y2
Type 4
Y1
Air block
Y3
Air input parameters:
- 5 bar press
- dry
- filtered
- no lubricant
D 2025-05-20 Fixed orifices replaced with Throttle adjustable valves SCA 2025-05-20 JPO
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
Material: Scale: 1:1 Format: A3
ID: Description: 16231000 Air diagram for Lavamin Rev: D
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 801

16231001


Lavamin
Air extraction
Drain
Over flow
Drain tube
Water level sensor
Ejector water pump
3.5 bar max
HP1
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
ID:
Description: 16231001 Water diagram for Lavamin
Rev: B
Struers

16233051


All contacts are shown under these conditions:
- un-powered
- workzone guard closed
Lavamin, Block Diagram
16233051
Printed Circuit Board (Cleaning station PCB)
BLDC-motor driver
Power Supply Input: 88-264VAC Output: 24VDC, 4.2A
Ultrasonic Generator 100W max., 40kHz
Safety Relay
Ultrasonic Transducers 2x50W
Main Supply in 100-120V, 50/60 Hz or 200-240V, 50/60 Hz
Voltage Selection: 115V or 230V
Work Zone Guard interlock (hood)
Sample holder 50-1800 rpm.
36VDC 46W
Brake Resistor
Hall Sensors Speed feedback
Touch pad
Touchpad Board LED's
Water level sensor
Accelerometer
Hood down
Hood up
Drying
Water inlet
Water pumping
RS232 connection
Connector for Initial prog.
Connector for Debug / Test

10.4 Legal and regulatory information

FCC notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

11 Manufacturer

Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark
Telephone: +45 44 600 800
Fax: +45 44 600 801
www.struers.com

Responsibility of the manufacturer

The following restrictions should be observed, as violation of the restrictions may cause cancellation of Struers legal obligations.

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

The manufacturer is to be considered responsible for effects on safety, reliability, and performance of the equipment only if the equipment is used, serviced, and maintained in accordance with the instructions for use.

Struers
Ensuring Certainty

Based on: 16237901 F

Declaration of Conformity

Manufacturer	Struers ApS • Pederstrupvej 84 • DK-2750 Ballerup • Denmark
Name	Lavamin
Model	N/A
Function	Specimen cleaning machine
Type	623
Cat. no.	06236233
Serial no.	

CE Module H, according to global approach **EU**

We declare that the product mentioned is in conformity with the following legislation, directives and standards:

2006/42/EC	EN ISO 12100:2010, EN ISO 13849-2:2012, EN ISO 14119:2013, EN ISO 13849-1:2015, EN ISO 14120:2015, EN 60204-1:2018, EN 60204-1-2018/Corr.:2020
2011/65/EU + 2015/863/EU	EN 63000:2018
2014/30/EU	EN 61000-6-1:2007, EN 61000-6-3:2007, EN 61000-6-3-A1:2011, EN 61000-6-3-A1-AC:2012, EN 61000-3-3:2013, EN 61000-3-2:2014
Additional standards	NFPA 79, FCC 47 CFR Part 15 Subpart B

Authorized to compile technical file/
Authorized signatory

Date: [Release date]

Struers
Ensuring Certainty

en	For translations see
bg	За преводи вижте
cs	Překlady viz
da	Se oversættelser på
de	Übersetzungen finden Sie unter
el	Για μεταφράσεις, ανατρέξτε στη διεύθυνση
es	Para ver las traducciones consulte
et	Tõlked leiate aadressilt
fi	Katso käännökset osoitteesta
fr	Pour les traductions, voir
hr	Za prijevode idite na
hu	A fordítások itt érhetők el
it	Per le traduzioni consultare
ja	翻訳については、
lt	Vertimai patalpinti
lv	Tulkojumus skatīt
nl	Voor vertalingen zie
no	For oversettelser se
pl	Aby znaleźć tłumaczenia, sprawdź
pt	Consulte as traduções disponíveis em
ro	Pentru traduceri, consultați
se	För översättningar besök
sk	Preklady sú dostupné na stránke
sl	Za prevode si oglejte
tr	Çeviriler için bkz
zh	翻译见

www.struers.com/Library