

Labotom-20

Instruction Manual

Original Instructions



CE

Doc. no.: 16937025-01_D_en
Date of release: 2024.03.22

Copyright

The contents of this manual are the property of Struers ApS. Reproduction of any part of this manual without the written permission of Struers ApS is not allowed.

All rights reserved. © Struers ApS.

Table of Contents

1 About this manual	6
2 Safety	6
2.1 Intended use	6
2.2 Safety devices	6
2.3 Labotom-20 safety precautions	7
2.3.1 Read carefully before use	7
2.4 Safety messages	8
2.4.1 Safety messages in this manual	9
3 Get started	12
3.1 Device description	12
3.2 Overview	13
3.3 Struers knowledge	15
3.4 Accessories and consumables	15
4 Installation	16
4.1 Unpack the machine	16
4.2 Check the packing list	16
4.3 Lift the machine	17
4.4 At the new location	19
4.5 Power supply	21
4.5.1 Connection to the machine	21
4.5.2 Power supply cable - recommended specifications	21
4.5.3 External short circuit protection	24
4.5.4 Residual Current Circuit Breaker (RCCB)	24
4.6 Connect the cooling system	24
4.6.1 Connect the water outlet to the cooling system	25
4.6.2 Connect the water inlet from the cooling system	26
4.6.3 Connect the communication cable to the cooling system	26
4.7 Connect to an exhaust system	26
4.8 Noise	27
4.9 Vibration	27
4.10 Extension tunnels (option)	27
4.10.1 Mounting extension tunnels	27
5 Transport and storage	29
5.1 Transport	29

5.2	Storage	31
6	Operate the device	31
6.1	Cut-off wheels	31
6.1.1	Selecting a cut-off wheel	31
6.1.2	Mount and dismount a cut-off wheel	31
6.2	Clamping devices	32
6.2.1	Position clamping devices	32
6.2.2	Vertical quick clamping devices	33
6.2.3	Mount a quick clamping device and spring clamp	33
6.3	Line laser	34
6.4	Basic operation	34
6.4.1	Control panel functions	34
6.4.2	Clamping the workpiece	35
6.4.3	Start and stop the cutting process	36
7	Maintenance and service - Labotom-20	37
7.1	Daily	37
7.1.1	Flushing gun	38
7.1.2	Cleaning the cutting chamber using AxioWash	38
7.1.3	Cleaning the cooling system	39
7.1.4	Checking the safety guard	39
7.1.5	Checking the cut-off wheel guard	39
7.1.6	Checking the safety guard lock	39
7.2	Weekly	40
7.2.1	Weekly cleaning	40
7.2.2	Cutting chamber	40
7.2.3	Cleaning the clamping devices	40
7.2.4	Cooling system	40
7.3	Monthly	40
7.3.1	Replacing the coolant	40
7.3.2	Maintaining cutting tables	41
7.4	Annually	41
7.4.1	Inspecting the safety guard	41
7.4.2	Cleaning the nozzle on the flushing gun	41
7.5	Cut-off wheels	42
7.5.1	Testing cut-off wheels	42
7.5.2	Storing conventional cut-off wheels	42
7.5.3	Storing diamond and CBN cut-off wheels	42
7.6	Test the safety devices	43
7.6.1	Emergency stop	43

7.6.2 Safety guard	43
7.6.3 Safety guard switch	44
7.6.4 Safety guard lock	44
7.6.5 Flushing function	45
8 Spare parts	45
9 Service and repair	46
10 Disposal	46
11 Troubleshooting	47
11.1 The machine	47
11.2 Cutting problems	49
12 Technical data	51
12.1 Technical data	51
12.2 Safety Circuit Categories/Performance Level	56
12.3 Safety Related Parts of the Control System (SRP/CS)	56
12.4 Diagrams Labotom-20	57
12.5 Legal and regulatory information	62
13 Manufacturer	62
Declaration of Conformity	63

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 manual wet abrasive cutting of materials for further material inspection and only to be operated by adult/skilled/trained personnel. The machine is intended only to be used with cooling fluids and cut-off wheels developed for this purpose and this machine.

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

Do not use the machine for the following

Cutting of materials other than solid materials suitable for materialographic studies. In particular, the machine must not be used for cutting of any type of explosive and/or flammable material (e.g. magnesium), or materials which are not stable during machining, heating or pressure.

The machine may not be used with cut-off wheels which are not compatible with the machine requirements (e.g. saw-blade or toothed cut-off wheels).

Model

Labotom-20
Labotom-20 - for tunnels

2.2 Safety devices

The machine is equipped with the following safety devices:

- Emergency stop
- Self-locking main safety guard
- Cut-off wheel guard

The locking mechanism is activated when you press the Start button to start a cutting process.

2.3 Labotom-20 safety precautions



2.3.1 Read carefully before use

Specific safety precautions - residual risks

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. The operator must read the Instruction Manual and, where applicable, the Safety Data Sheets for the applied consumables.
4. The machine must be placed on a safe and stable table with an adequate working height. The table must be able to carry at least the weight of the machine and the accessories.
5. Laser radiation. Do not stare into beam or expose users of telescopic optics. Class 2M laser product.
6. Always use intact cut-off wheels that have been approved for a minimum of: 60 m/s.
7. Do not use the machine with saw-blade type cut-off wheels.
8. Observe the current safety regulations regarding handling, mixing, filling, emptying, and disposing of cooling fluids with additives. Avoid skin contact.
9. Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens. Wear gloves when flushing and cleaning the machine.
10. Always wear safety shoes when handling workpieces.
11. Always mark or shield protruding workpieces if they extend outside the machine.

General safety precautions

1. The use of an exhaust system is required as the cutting liquids, materials to be cut and cut-off wheels can emit harmful gasses, fumes, or dust. Always use an exhaust system to handle fumes when advised in the safety data sheets.
2. The machine emits moderate noise. However, the cutting process can be noisy depending on the nature of the workpiece. Use hearing protection if the exposure to noise exceeds the levels set by local regulations.
3. The machine must be disconnected from the electrical power supply before any service.
4. In case of fire, alert bystanders and the fire brigade. Cut off the power. Use a powder fire extinguisher. Do not use water.
5. Struers equipment must only be used in connection with and as described in the Instruction Manual supplied with the equipment.

6. 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.
7. Dismantling of any part of the equipment, during service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).

2.4 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.



DANGER

This sign indicates a hazard with a high level of risk 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.



CAUTION

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



CRUSHING HAZARD

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



HEAT HAZARD

This sign indicates a heat hazard which, if not avoided, can result in minor, moderate or serious injury.



Emergency stop

Emergency stop

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.

2.4.1 Safety messages in this manual

**WARNING**

If there are visible signs of deterioration or damage to the safety guard, it must be replaced immediately.
Contact Struers Service.

**WARNING**

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

**WARNING**

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

**WARNING**

Do not use the machine with defective safety devices. Testing must be performed at least once a year.
Contact Struers Service.

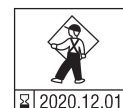
**WARNING**

The safety guard must be replaced immediately if the protective screen has been weakened by collision with projectile objects or if you see any visible signs of deterioration or damage. Contact Struers Service.

**WARNING**

The safety guard screen must be replaced every 5 years to ensure its intended safety. A label on the screen indicates when it must be replaced.

 **Struers**
Safety glass
Sicherheitsglas
Verre sécurité

**WARNING**

The safety guard must be replaced every 5 years to ensure its intended safety. A label on the screen indicates when the safety guard is due to be replaced.

**WARNING**

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

**WARNING**

If you are working with a round workpiece, make sure that it is securely fixed. If it is not, it can roll out of the cutting chamber and land on your feet.

**WARNING**

Wear gloves when flushing and cleaning the machine.



WARNING

Do not use acetone, benzol or similar solvents.



ELECTRICAL HAZARD

The machine must be earthed (grounded).
Switch off the electrical power supply before installing electrical equipment.



ELECTRICAL HAZARD

Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the type plate of the machine.
Incorrect voltage can damage the electrical circuit.



ELECTRICAL HAZARD

The machine must always be protected by external fuses. See the electrical table for details on the fuse size required.



ELECTRICAL HAZARD

For electrical installations with Residual Current Circuit Breakers

For Labotom-20 a residual current circuit breaker Type B, 30 mA is required (EN 50178/5.2.11.1).

For electrical installations with Residual Current Circuit Breakers

For Labotom-20 a residual current circuit breaker Type A, 30 mA is required (EN 50178/5.2.11.1).

For electrical installations without Residual Current Circuit Breakers

The equipment must be protected by an insulation transformer (double-wound transformer).

Contact a qualified electrician to verify the solution.

Always follow local regulations.



ELECTRICAL HAZARD

Disconnect the electrical power supply before installing electrical equipment.



ELECTRICAL HAZARD

The pump of the recirculation cooling unit must be earthed (grounded).
Make sure that the electrical power supply voltage corresponds to the voltage stated on the type plate of the pump.
Incorrect voltage can damage the electrical circuit.



ELECTRICAL HAZARD

Disconnecting the unit from the electrical power supply must only be done by a qualified technician.



HEAT HAZARD

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

**CRUSHING HAZARD**

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

**CAUTION**

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

**CAUTION**

Laser radiation. Do not stare into beam or expose users of telescopic optics. Class 2M laser product.

**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.

**CAUTION**

Risk of hand to arm vibration during manual cutting.
Prolonged exposure to vibration may cause discomfort, joint damage or even neurological damage.

**CAUTION**

Never use the machine without the blinders on the sides of the safety guard.

**CAUTION**

Do not use the machine with non-compatible accessories or consumables.

**CAUTION**

Always close the safety guard carefully to avoid injuries.

**CAUTION**

The pressure of the cooling fluid supplied to the machine must be max: 9.9 bar (143 psi).

**CAUTION**

Always wear safety shoes when handling workpieces.

**CAUTION**

The machine is heavy. Always use a crane and lifting strap.



CAUTION

Avoid skin contact with the coolant additive.
Do not start flushing until the flushing gun points into the cutting chamber.
Only use the flushing gun for cleaning inside the cutting chamber.
Always wear safety goggles while using the flushing gun.



CAUTION

Do not start flushing until the flushing gun points into the cutting chamber.



CAUTION

Always use goggles or a protective shield, and chemical-resistant gloves.



CAUTION

Avoid skin contact with the coolant additive.
Always use goggles or a protective shield, and chemical-resistant gloves.



CAUTION

Do not start flushing until the flushing gun points into the cutting chamber.
Only use the flushing gun for cleaning inside the cutting chamber.
Always wear safety goggles while using the flushing gun.

3 Get started

3.1 Device description

Labotom-20 is a manual cut-off machine designed for cutting materialographic workpieces. The machine is designed for wet abrasive cutting of all stable and non-explosive metals. It must be equipped with a recirculation system for cooling liquid.

Labotom-20 for tunnels can be fitted with tunnels on each side or both sides in case the operator needs to cut long workpieces.

The cutting process starts by securing the workpiece to the cutting table with clamping devices. The equipment is equipped with a laser guide line for positioning of the workpiece.

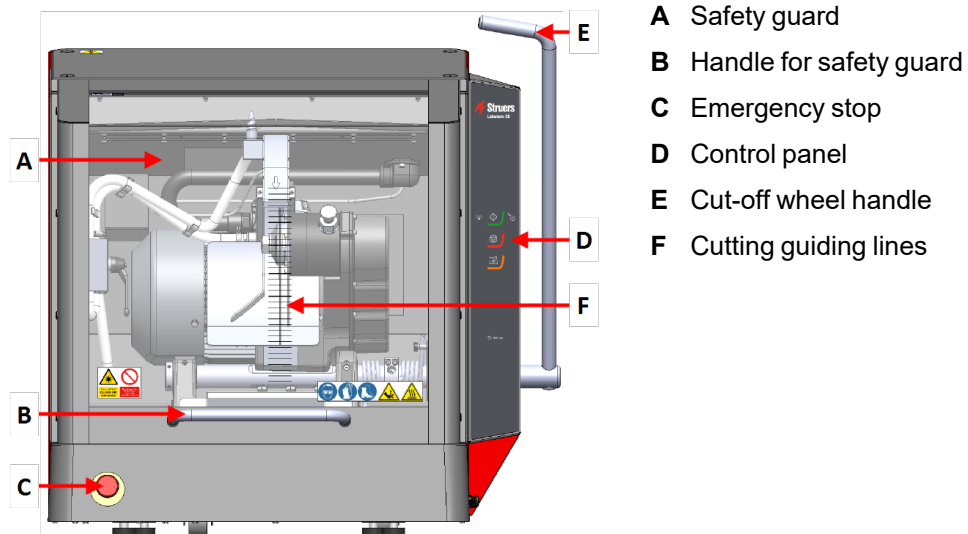
The operator closes the safety guard, which locks when the operator starts the machine. It remains locked for the duration of the cutting. The operator performs the cutting action by manually pulling the handle driving the cut-off wheel through the workpiece. The operator stops the machine and when the cut-off wheel stops, the safety guard lock releases and the workpiece can be removed.

In case of a power loss during a cutting process, the safety guard remains locked. To open the safety guard, use the special key to open the safety lock on the safety guard.

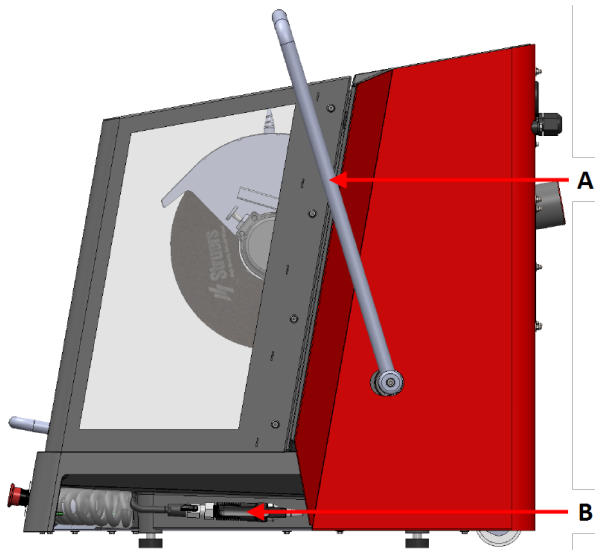
The machine can be connected to an external exhaust system to remove fumes from the cutting process.

3.2 Overview

Front view

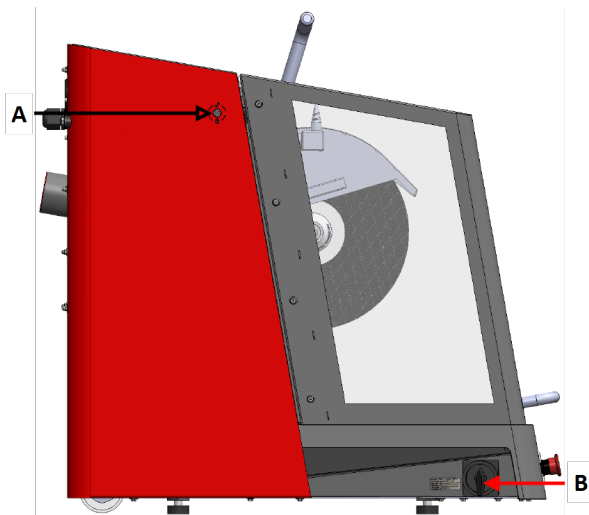


Side view



Right side

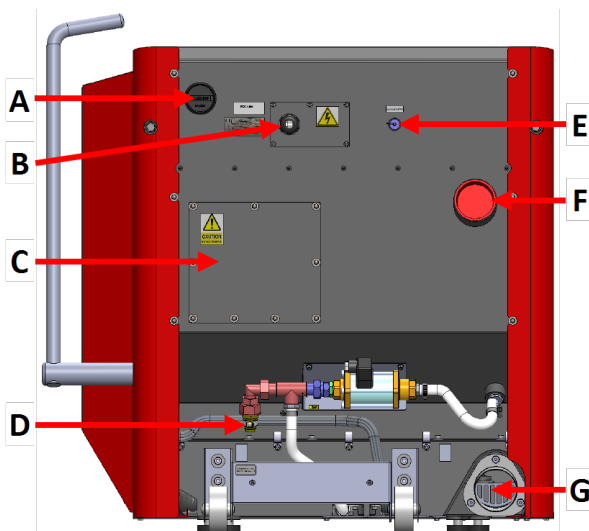
- A** Cut-off wheel handle
- B** Flushing gun



Left side

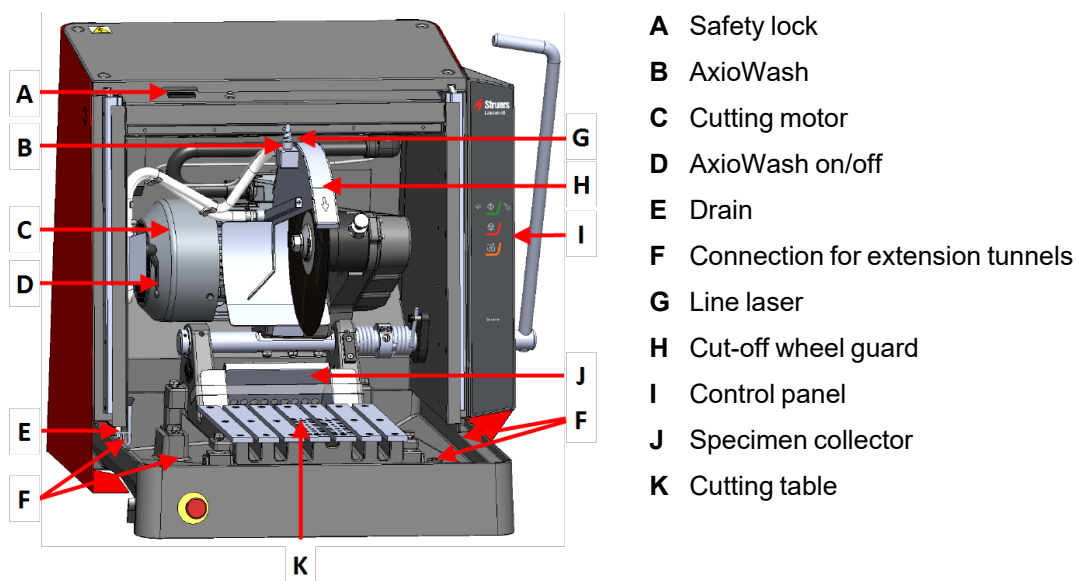
- A** Safety lock release
- B** Main switch

Rear view



- A** Motor turn-on counter
- B** Power socket
- C** Compartment for service technician
- D** Water inlet
- E** Socket for cooling system connection
- F** Connection for exhaust
- G** Water outlet

Inside the machine



3.3 Struers knowledge

Materialographic cutting is where most micro-structure analysis begins.

A good understanding of the cutting process can help in selecting suitable clamping and cutting methods and thereby ensure the high-quality cut.

Minimizing cutting artifacts will help the remaining materialographic process and act as a good base for efficient and high-quality preparation.



Hint

For further information, see the section on Cutting on the Struers website.

3.4 Accessories and consumables

Accessories

For information about the available range, see the Labotom-20 brochure:

- [The Struers Website](http://www.struers.com) (<http://www.struers.com>)

Consumables

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

Other products may contain aggressive solvents, which dissolve e.g. rubber seals. The warranty may not cover damaged machine parts (e.g. seals and tubes), where the damage can be directly related to the use of consumables not supplied by Struers.

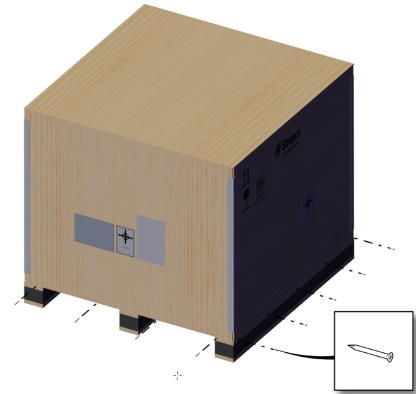
For information about the available range, see: [The Struers Website](http://www.struers.com) (<http://www.struers.com>).

4 Installation

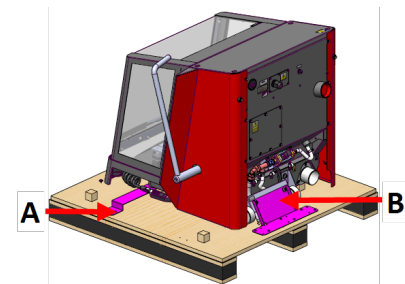
4.1 Unpack the machine

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

1. Remove the screws and the crate. Use a screwdriver PH 2.



2. Use a Torque bit T20 to remove the transport bracket (A).
3. Use a Torque bit T20 to remove the screws on the pallet (B).
4. Use a 6 mm Allen key to remove the screws that fasten the machine to the bracket (B).
5. Remove the transport brackets.



4.2 Check the packing list

Optional accessories may be included in the packing box.

The packing box contains the following items:

Pcs.	Description
1	Labotom-20
1	Open-end wrench, 300 mm, for changing the cut-off wheel
1	Triangular key, for opening the safety guard when the power is off.
1	Elbow pipe for water outlet
1	Water outlet hose, 2 m (79")
1	Hose clamp

Pcs.	Description
1	Grate for outlet. Use only if you are cutting very small specimens.
1	Lifting console
1	Red plug for exhaust hole (if you are not using an exhaust system)
1	Manual set

4.3 Lift the machine



CRUSHING HAZARD

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



CAUTION

The machine is heavy. Always use a crane and lifting strap.

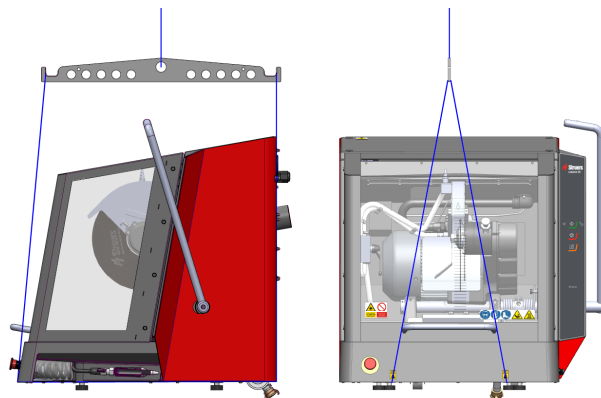
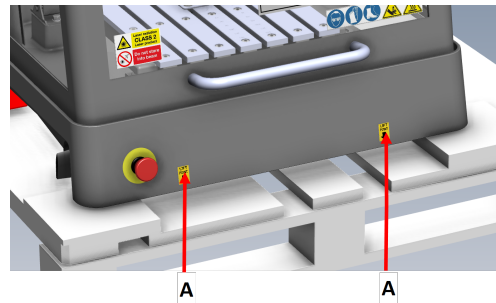
1. Use a crane, the lifting console included in the package, and lifting straps to lift the machine.

The crane must have a lifting capacity of minimum 250 kg (552 lbs).

2. Place the lifting straps under the base of the machine, on both the right side and the left side. (A)
3. Place the front and back straps on the inner side of the feet.

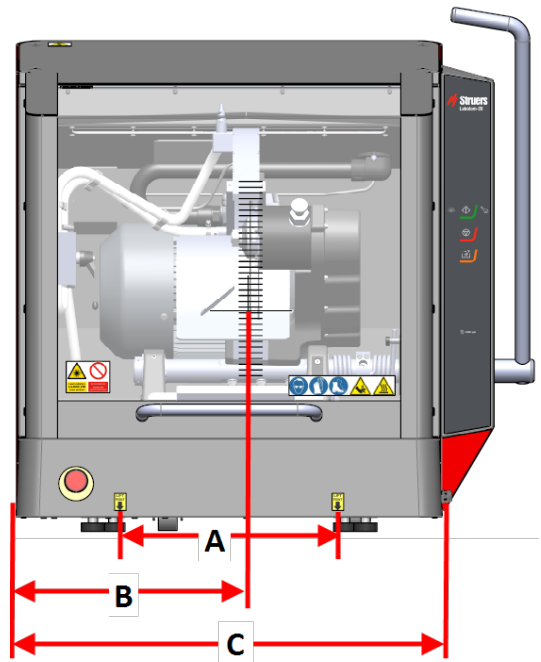
Be careful when placing the lifting straps, as these can damage the safety guard.

4. Make sure that the straps are parallel to each other and position the lifting bar so that both straps are kept apart below the lifting points.

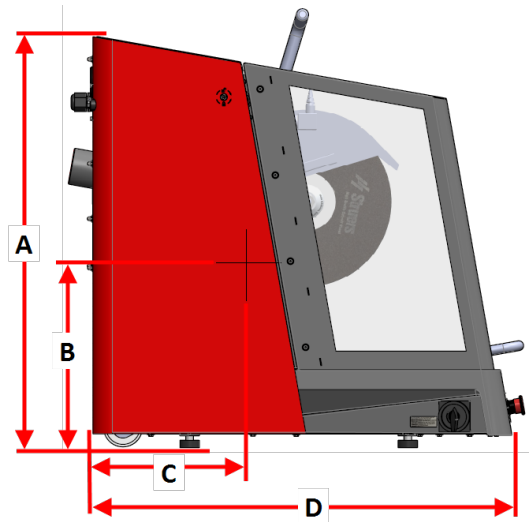


Center of gravity

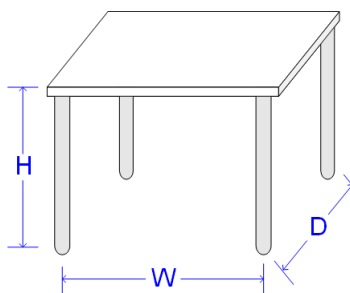
- A:** 37.5 cm (14.7")
- B:** 40 cm (15.6")
- C:** 73.5 cm (29")



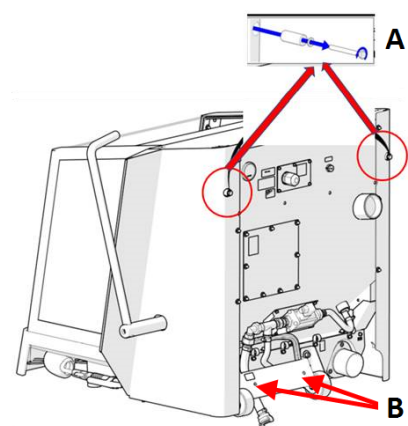
- A:** 90 cm (35.5")
- B:** 38 cm (15")
- C:** 31.5 cm (12.4")
- D:** 86.5 cm (34")



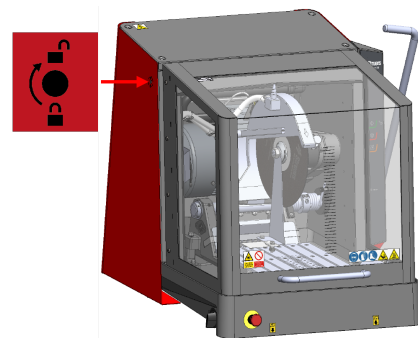
4.4 At the new location

Recommended workbench dimensions		
Height	Recommended: 80 cm (31.5")	
Width	92 cm (36.2")	
Depth	90 cm (35.4")	
The workbench must be able to carry at least: 350 kg (772 lbs)		

1. Install the machine close to the power supply, the exhaust system and the cooling system.
2. Make sure there is enough room behind the machine for the inlet and outlet hose.
3. Install the machine in a room with sufficient light.
4. Place the machine on a rigid, stable workbench with a horizontal surface and an adequate height.
5. Make sure that the machine is level and that all 4 feet rest on the workbench.
6. Dismount the two distance washers (A) on the rear side of the machine and place them in their holders (B).

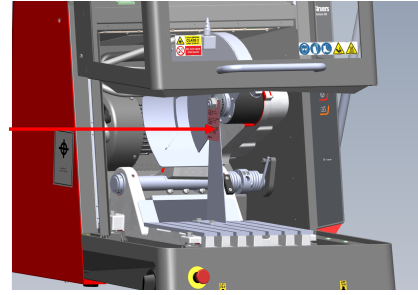


7. Unlock the safety guard by turning the triangular key included in the packing box clockwise.
See [Check the packing list](#) ► 16
8. To reset the lock on the safety guard, turn the triangular key counter-clockwise.

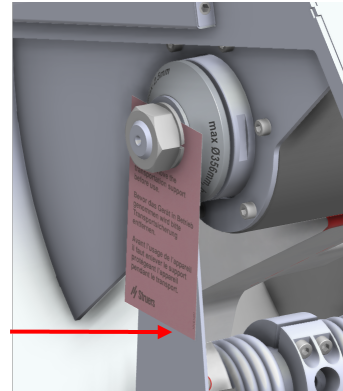


4 Installation

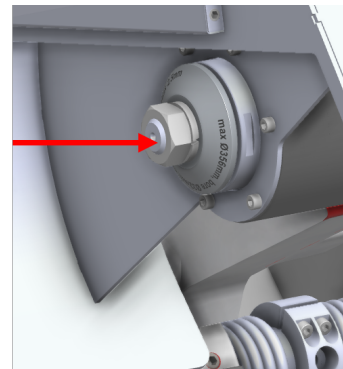
9. Open the safety guard and unscrew the fasteners that keep the transport bracket in place. Use a 30 mm (1.18") wrench, and a 13 mm (0.51") wrench.



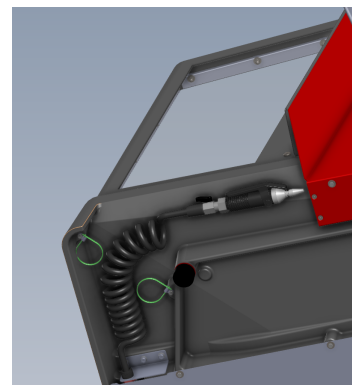
10. Remove the transport bracket.



11. Place the M20 nut into place again.



12. Unpack the water hose by removing the cover foil and cable ties.



4.5 Power supply



ELECTRICAL HAZARD

The machine must be earthed (grounded).
Switch off the electrical power supply before installing electrical equipment.



ELECTRICAL HAZARD

Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the type plate of the machine.
Incorrect voltage can damage the electrical circuit.

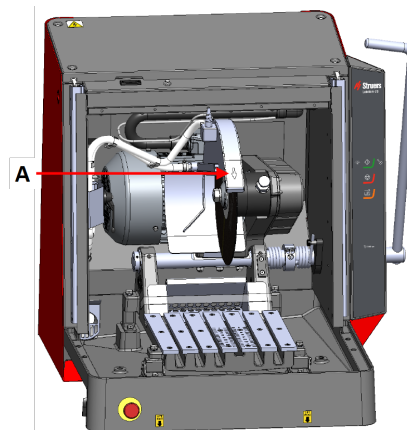
4.5.1 Connection to the machine

Procedure

1. Open the electrical connection box.
2. Connect the power cable as shown.

EU cable	UL cable
L1: Brown	L1: Black
L2: Black	L2: Red
L3: Black/Grey	L3: Orange/Turquoise
Earth (ground): Yellow/Green	Earth (ground): Green (or Yellow/Green)
Neutral: Blue - Not used	Neutral: White - Not used

After installing the machine, make sure that the cut-off wheel rotates in the correct direction. The correct direction is indicated on the cut-off wheel guard (A).



4.5.2 Power supply cable - recommended specifications

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.

Voltage/frequency: 3 x 200 V/50 Hz	
Max. fuse: 3 x 50 A	Minimum cable size at maximum fuse: 5 x 4 mm ² + PE
Voltage/frequency: 3 x 220-230 V/50 Hz	
Max. fuse: 3 x 50 A	Minimum cable size at maximum fuse: 5 x 4 mm ² + PE
Voltage/frequency: 3 x 380-415 V/50 Hz	
Max. fuse: 3 x 40 A	Minimum cable size at maximum fuse: 5 x 2.5 mm ² + PE
Voltage/frequency: 3 x 200-210 V/60 Hz	
Max. fuse: 3 x 50 A	Minimum cable size at maximum fuse: 5 x AWG8 + PE
Voltage/frequency: 3 x 220-240 V/60 Hz	
Max. fuse: 3 x 50 A	Minimum cable size at maximum fuse: 5 x AWG8 + PE
Voltage/frequency: 3 x 380-415V/60 Hz	
Max. fuse: 3 x 40 A	Minimum cable size at maximum fuse: 5 x AWG12 + PE
Voltage/frequency: 3 x 460-480 V/60 Hz	
Max. fuse: 3 x 40 A	Minimum cable size at maximum fuse: 5 x AWG12 + PE

Electrical data

The other end of the cable can be fitted with an approved plug or hard-wired into the power supply according to the electrical specifications and local regulations.

**ELECTRICAL HAZARD**

The machine must always be protected by external fuses. See the table below for the fuse size required.

Voltage/frequency: 3 x 200 V/50 Hz	
Power, nominal load	S3 60%: 5.5 kW (7.4 hp) S3 15%: 7.5 kW (10 hp)
Number of phases	3 (3L + PE)

Voltage/frequency: 3 x 200 V/50 Hz	
Power, nominal load	22.9 A
Power, Max. load	45.8 A
Ampere rating, largest motor	21.9 A

Voltage/frequency: 3 x 200-210 V/60 Hz	
Power, nominal load	S3 60%: 6.6 kW (8.8 hp) S3 15%: 8.5 kW (11.4 hp)
Number of phases	3 (3L + PE)
Power, nominal load	27.1 A
Power, Max. load	54.2 A
Ampere rating, largest motor	26.1 A

Voltage/frequency: 3 x 220-230 V/50 Hz	
Power, nominal load	S3 60%: 5.5 kW (7.4 hp) S3 15%: 7.5 kW (10 hp)
Number of phases	3 (3L + PE)
Power, nominal load	20.1 A
Power, Max. load	40.2 A
Ampere rating, largest motor	19.1 A

Voltage/frequency: 3 x 220-240 V/60 Hz	
Power, nominal load	S3 60%: 6.6 kW (8.8 hp) S3 15%: 8.5 kW (11.4 hp)
Number of phases	3 (3L + PE)
Power, nominal load	22.5 A
Power, Max. load	45 A
Ampere rating, largest motor	21.5 A

Voltage/frequency: 3 x 380-415V/50 Hz	
Power, nominal load	S3 60%: 5.5 kW (7.4 hp) S3 15%: 7.5 kW (10 hp)
Number of phases	3 (3L + PE)
Power, nominal load	12 A
Power, Max. load	24 A
Ampere rating, largest motor	11 A

Voltage/frequency: 3 x 380-415V/60 Hz	
Power, nominal load	S3 60%: 6.6 kW (8.8 hp) S3 15%: 8.5 kW (11.4 hp)
Number of phases	3 (3L + PE)
Power, nominal load	13.4 A
Power, Max. load	26.8 A
Ampere rating, largest motor	12.4 A

Voltage/frequency: 3 x 460-480 V/60 Hz	
Power, nominal load	S3 60%: 6.6 kW (8.8 hp) S3 15%: 8.5 kW (11.4 hp)
Number of phases	3 (3L + PE)
Power, nominal load	12.4 A
Power, Max. load	24.8 A
Ampere rating, largest motor	11.4 A

4.5.3 External short circuit protection



ELECTRICAL HAZARD

The machine must always be protected by external fuses. See the electrical table for details on the fuse size required.

4.5.4 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.

Requirements for electrical installations	
With Residual Current Circuit Breakers (RCCB) - Required	Type A, 30 mA (EN 50178/5.2.11.1) or better

4.6 Connect the cooling system

To ensure optimal cooling, mount a recirculation cooling unit on the machine. This is sold separately.



ELECTRICAL HAZARD

The pump of the recirculation cooling unit must be earthed (grounded). Make sure that the electrical power supply voltage corresponds to the voltage stated on the type plate of the pump. Incorrect voltage can damage the electrical circuit.

**CAUTION**

The pressure of the cooling fluid supplied to the machine must be max. 9.9 bar (143 psi).

**Note**

Before you connect the recirculation unit to the machine, you must prepare it for use. See the Instruction Manual for this unit.

**Note**

Struers recommends that the flushing gun is operated at a pressure of max. 3 bar.

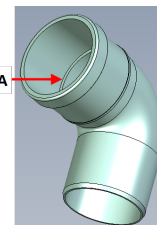
**Note****Consumables**

- Struers recommends adding a Struers anti-corrosion additive to the coolant.
- The use of Struers consumables is recommended.

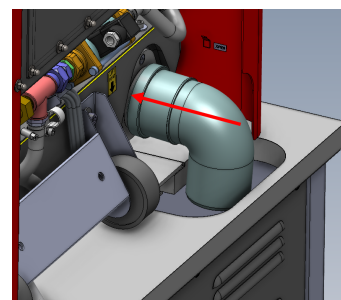
Other products may contain aggressive solvents, which dissolve e.g. rubber seals. The warranty may not cover damaged machine parts (e.g. seals and tubes), where the damage can be directly related to the use of consumables not supplied by Struers.

4.6.1 Connect the water outlet to the cooling system

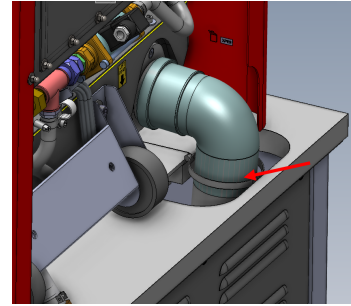
1. Lubricate the sealing ring (A) on the elbow pipe with soapy water to facilitate insertion.



2. Slide the elbow pipe onto the metal flange.
3. Place the tube so that it points downwards.



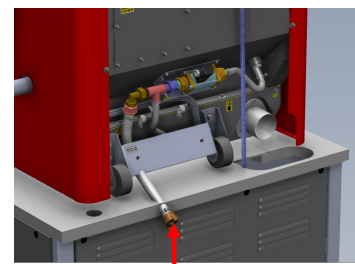
4. Connect the flex hose and secure it with a hose clamp. Use a 7 mm (0.27") wrench.



5. Connect the opposite end of the flex hose to the cooling system.

4.6.2 Connect the water inlet from the cooling system

- Connect the hose with quick coupling to the cooling system water pump.

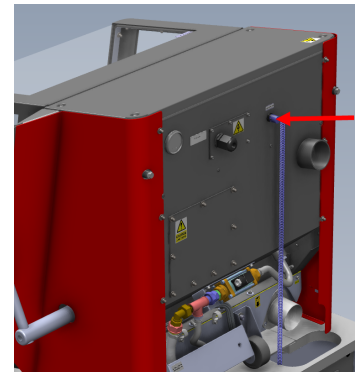


Note

The cooling water pressure must not exceed 9.9 bar (143 psi)

4.6.3 Connect the communication cable to the cooling system

- Connect the communication cable from the cooling system control unit to the control socket on the machine.



4.7 Connect to an exhaust system

Labotom-20 must be connected to an external exhaust system.

You can connect Labotom-20 to an exhaust system via a hole on the rear of the cabinet. If you are not using an exhaust system, use the red plug supplied to cover the hole on the rear of the cabinet. See also: [Technical data](#) ► 51.

1. Mount the exhaust hose (Diameter: 75 mm (2.75")) from your exhaust system onto the pipe.
2. Clamp the exhaust hose using a hose clamp.

Specifications

See the section [Technical data ▶ 51](#) .

4.8 Noise

For information on the sound pressure level value, see this section: [Technical data ▶ 51](#).



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.

Handling noise during operation

Different materials have different noise characteristics. To reduce the noise level, decrease the rotational speed and/or the force with which the cut-off wheel is pressed against the workpiece.

4.9 Vibration

For information on the total vibration exposure to hand and arm, see this section: [Technical data ▶ 51](#)



CAUTION

Risk of hand to arm vibration during manual cutting.

Prolonged exposure to vibration may cause discomfort, joint damage or even neurological damage.

Handling vibration during operation

Manual cutting may cause vibrations in hand and arm. To lower the vibration, decrease the pressure or use a vibration-reducing glove.

Always use recommended Struers clamping solutions to reduce the source of vibration.

4.10 Extension tunnels (option)

Extension tunnels (option) can be useful if you are working with large workpieces.

4.10.1 Mounting extension tunnels

If you work with long specimens, it can be helpful to mount extension tunnels on the machine.

If the machine is ready to be used with extension tunnels, you can mount extension tunnels on one or both sides.

If the machine is not ready to be used with tunnels, you must have the safety guard replaced to be able to mount extension tunnels. Contact Struers Service.

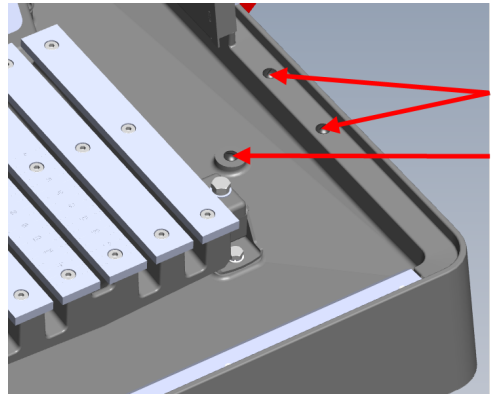


CAUTION

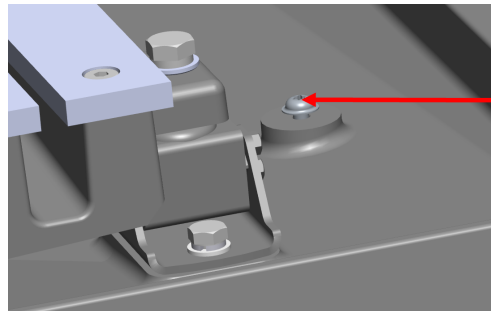
Never use the machine without the blinders on the sides of the safety guard.

Mounting one or two extension tunnels on the machine

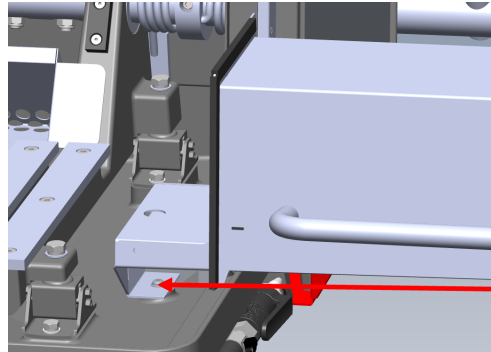
- 1. Remove the three set screws from the base on the right or left side of the machine, or both if you are installing extension tunnels on both sides.



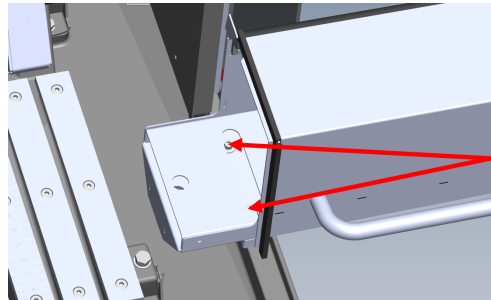
- 2. Mount the M6x12 screw on the tower inside the cutting chamber using a X30 bit.
Do not tighten the screw. Keep a gap of 3-4 mm (0.11-0.15").



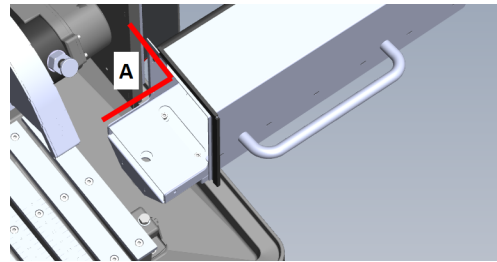
- 3. Place the extension tunnel inside the tower.
- 4. Move the extension tunnel to the side, and make sure that the screw is placed inside the slot.



- 5. Mount the 2 washers and 2 M6x34 screws in the part of the extension tunnel that is inside the cutting chamber.
Use a 5 mm (0.19") hexagonal bit.
- 6. Tighten the screws loosely.

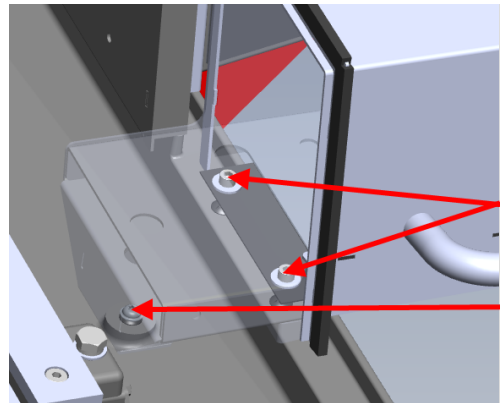


7. Make sure that the extension tunnel is positioned correctly using an angle measurement tool. The angle must be 90°.



A 90°

8. Tighten all 3 screws applying a 10 Nm force.



5 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.

5.1 Transport



ELECTRICAL HAZARD

Disconnecting the unit from the electrical power supply must only be done by a qualified technician.



CAUTION

The machine is heavy. Always use a crane and lifting strap.



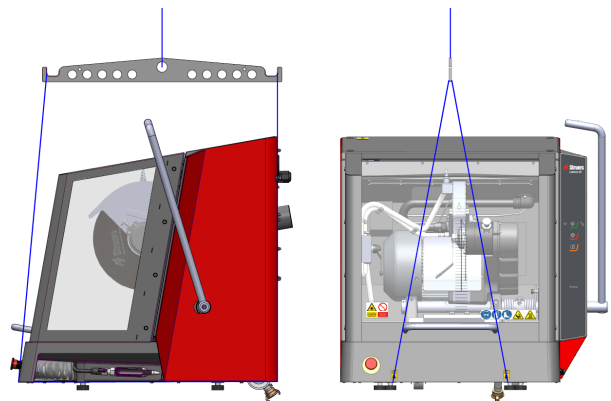
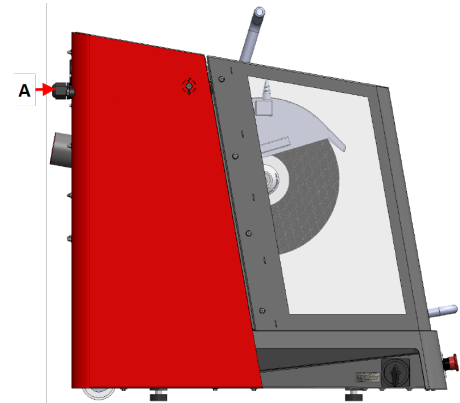
Note

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

Procedure

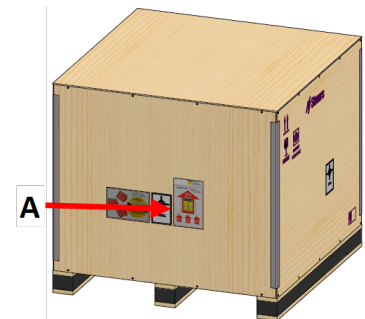
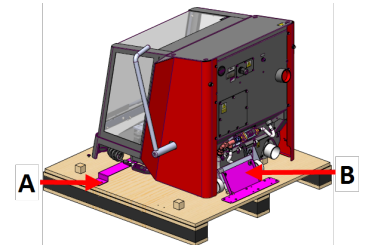
To transport the machine safely, follow these instructions.

1. Disconnect the electrical power supply.
2. Disconnect the cooling system, if installed. See the instructions for the specific unit. Move the cooling system out of the way.
3. Disconnect the exhaust system.
4. Mount the two distance washers on the rear side of the machine. (A)
5. Place the lifting straps on the designated lifting points on the machine
6. Move the unit to its new position.



If the machine is bound for long-time storage or shipping

1. Screw the transport brackets into place. Use a torque bit T20 (A), and a 6 mm Allen key (B).
2. Place the accessories box and other loose items in the crate. To keep the machine dry, plastic wrap the machine and place a bag of desiccant (silica gel) with the machine.
3. Place the crate on the pallet.
4. Make sure that the front of the crate faces the safety guard (A).
5. Screw the screws into place to fasten the crate to the pallet. Use a screwdriver PH 2.



A Front of the crate

5.2 Storage



Note

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

- Disconnect the unit from the electrical power supply.
- Remove any accessories.
- Clean and dry the unit before storage.
- Place the machine and accessories in their original packaging.

6 Operate the device

6.1 Cut-off wheels



CAUTION

Do not use the machine with non-compatible accessories or consumables.

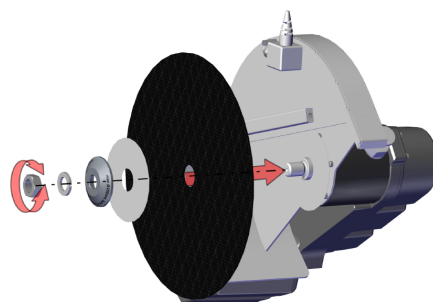
Cut-off wheels are ordered separately.


6.1.1 Selecting a cut-off wheel


For information on how to select the correct cut-off wheel, see the section on Cutting on the Struers website.

6.1.2 Mount and dismount a cut-off wheel


1. Push the cutting handle backwards until the cutting unit is in its rear-most position.
2. Press the pin for the spindle lock on the right side of the cut-off wheel guard.
3. Turn the cut-off wheel until the spindle lock clicks.
4. Remove the nut with the spanner.
5. Remove the spring washer, flange and cut-off wheel (if mounted).
6. Mount a new cut-off wheel, flange, spring washer and nut.
7. Tighten the nut securely with the spanner and release the spindle lock.




 **Note**
The spindle on the machine is left-hand threaded.

 **Note**
Place conventional cut-off wheels, such as $\text{Al}_2\text{O}_3/\text{SiC}$ between two cardboard discs in order to protect the cut-off wheel and the flanges.
For maximum precision with diamond or CBN cut-off wheels, do not use cardboard discs.

6.2 Clamping devices

 **WARNING**
If you are working with a round workpiece, make sure that it is securely fixed. If it is not, it can roll out of the cutting chamber and land on your feet.

 **CAUTION**
Do not use the machine with non-compatible accessories or consumables.

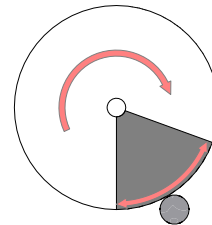
Clamping devices are ordered separately.

6.2.1 Position clamping devices

1. Always position clamping devices parallel to the cutting table.
2. Place the workpiece in the middle or slightly to the front of the cutting table.

Lines on the cutting table help you place the workpiece in the correct position.

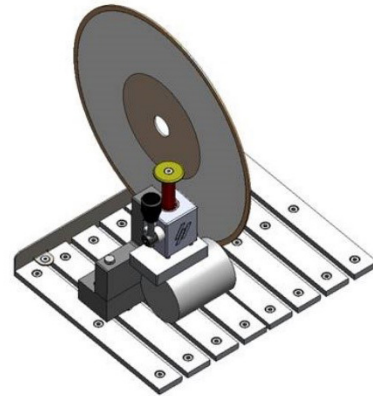
You obtain the best results when the lower quadrant of the cut-off wheel enters the workpiece (the shaded area on the illustration).



6.2.2 Vertical quick clamping devices

1. Mount the vertical quick clamping device on the left side of the cutting table.
2. Place the workpiece on the cutting table.
3. Turn the handle on the clamping device to the vertical position.
4. Push the clamping device downwards on the workpiece and lock it in place by pulling the locking handle forward.

The illustration shows a cylindrical workpiece secured with a vertical quick clamping device.



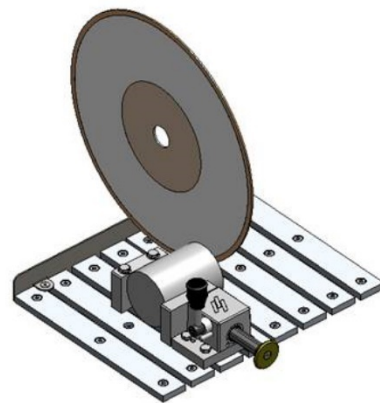
Note

Make sure that the nut on the cutting unit cannot come into contact with the clamping plate.

6.2.3 Mount a quick clamping device and spring clamp

1. Mount the back stop for the quick clamping device on the left side of the cutting table. Make sure that the cut-out corner is placed to the right.
2. Mount the back stop for the spring clamp on the right side of the cutting table.
3. Place the workpiece in the middle or slightly to the front of the cutting table.
4. Push the back stops against the workpiece and use the spanner to tighten the screws.
5. Mount the quick clamping device on the left side of the cutting table, and the spring clamp on the right side.
6. Adjust the clamping devices until they fit the workpiece.
7. Tighten the screws with the spanner.

The illustration shows a cylindrical workpiece secured with a quick clamping device.



6.3 Line laser

 **CAUTION**
Laser radiation. Do not stare into beam or expose users of telescopic optics. Class 2M laser product.


		
---	---	---

For more information on the line laser, see: [Technical data](#) ▶ 51.


The laser beam indicates the position of the cut for a precise placement of the workpiece.


The laser is automatically activated when the machine is switched on, and it is deactivated when you start the machine.


In case the line laser is not aligned, you can adjust it by using the two screws on the cut-off wheel guard.

 **Note**
The laser is aligned with the inner flange and not with the cut-off wheel due to the variation in the thickness of the cut-off wheels.

6.4 Basic operation






 **CAUTION**
Always close the safety guard carefully to avoid injuries.

 **CAUTION**
Always wear safety shoes when handling workpieces.

 **HEAT HAZARD**
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.


6.4.1 Control panel functions




Button/LED	Function
	<p>Start</p> <p>Starts the machine. The cut-off wheel starts rotating and the cooling water pump is turned on.</p> <p>You cannot activate this function if the safety guard is open, or if the cutting motor is overloaded.</p> <p>Use this button to start AxioWash if you have turned the lever upwards.</p>
	<p>This icon indicates that AxioWash is activated when the machine is started.</p>
	<p>This icon indicates that cooling water is activated when the machine is started.</p>
	<p>Stop</p> <p>Stops the machine. The cut-off wheel stops rotating.</p> <p>Use this button to stop AxioWash.</p> <p>The cooling water pump is turned off.</p>
	<p>Flush</p> <p>Starts the cooling water pump. Press on the rear of the flushing gun to start and regulate flushing.</p>


6.4.2 Clamping the workpiece

1. Use the flushing gun to clean the cutting table.
2. Make sure that the specimen collector is in place in order to collect the cut specimen and to protect the painted surface.
3. Place the workpiece under the clamp of a quick clamping device, on the left side of the cutting table.
4. Adjust the position of the clamping device so that the workpiece is placed in the middle of the cutting table.
5. Use the socket spanner to tighten the clamping device.
6. Lower the cut-off wheel to check the position of the cut.
7. Turn the handle on the clamping device to the vertical position.
8. Push the clamping device downwards on the workpiece and lock it in place pushing the locking handle forward. See : [Vertical quick clamping devices](#) ► 33.

 **Note**
Make sure that the workpiece is firmly and securely fixed in the clamping device. If it is not, the workpiece can loosen and cause the cut-off wheel to break and/or unintended deformations to the workpiece and accessories.

6.4.3 Start and stop the cutting process

 **WARNING**
Wear gloves when flushing and cleaning the machine.

 **HEAT HAZARD**
Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.

1. Switch on the machine.
2. Make sure that the specimen collector is in place in order to collect the cut specimen and to protect the painted surface.
3. Close the safety guard.
4. Press Start. The cut-off wheel starts rotating.
5. The cooling water starts to flow.
6. Carefully move the cut-off wheel towards the workpiece by pulling the cutting handle until it is in contact with the workpiece.
7. Make a small notch into the workpiece.
If a new cut-off wheel is used, position the cut-off wheel so that it just touches the workpiece until the edge of the cut-off wheel is worn equally around the entire diameter.
8. Increase the force and continue cutting. Adjust the speed at which the cut-off wheel is fed through the workpiece to suit the material and the cut-off wheel.
You can use the guiding lines on the safety guard to help you keep a constant cutting speed. See also: [Overview ▶ 13](#).
9. Reduce the cutting force when the cut-off wheel has almost cut through the material.
10. When you finish cutting through the workpiece, return the cutting handle to the start position.
11. Press Stop to stop the cut-off wheel and the coolant.
12. Wait until the safety lock is released before you open the safety guard.



**Note**

If you are working with large or very hard workpieces, you will need a certain amount of strength to cut through.

**Note**

The safety guard on Labotom-20 has a safety guard lock. The motor will not start as long as the safety guard is open.
Leave the safety guard open when the machine is not in use to let the cutting chamber dry completely. This can prevent corrosion from condensation.

**Note**

You cannot open the safety guard until the safety lock is released - this takes 5 seconds after you have pressed the Stop button.

7 Maintenance and service - Labotom-20

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 type plate of the machine.

7.1 Daily

To ensure a longer lifetime for your machine, we strongly recommend regular cleaning.

**WARNING**

Do not use acetone, benzol or similar solvents.

**Note**

Clean all accessible surfaces with a soft, damp cloth.
Do not use a dry cloth as the surfaces are not scratch resistant.
Never use alcohol to clean the lamp glass. Only use a damp cloth.

7.1.1 Flushing gun



CAUTION

Avoid skin contact with the coolant additive.
Do not start flushing until the flushing gun points into the cutting chamber.
Only use the flushing gun for cleaning inside the cutting chamber.
Always wear safety goggles while using the flushing gun.

1. Remove the flushing gun from the holder.
2. Point the gun into the flushing chamber.
3. Open the valve on the flushing gun.
4. To avoid splashing water while cleaning, use the valve located just before the flushing gun to reduce the maximum water pressure.
5. Select Flush to start the water pump.
6. Press the rear of the nozzle and clean the cutting chamber.
7. Press Stop to stop flushing.
8. Close the valve and place the flushing gun back in the holder.
9. Leave the safety guard open to allow the cutting chamber to dry and to avoid corrosion.



Note

Always place the flushing gun back in its holder when you have finished using it.
Do not use the flushing gun to clean the safety guard as this can result in water dripping when the safety guard is open.
We recommend that the flushing gun is operated at a pressure of max. 3 bar.

7.1.2 Cleaning the cutting chamber using AxioWash



CAUTION

Avoid skin contact with the coolant additive.



Note

Clean the cutting chamber thoroughly if you are not going to use the machine for a longer period of time.



Note

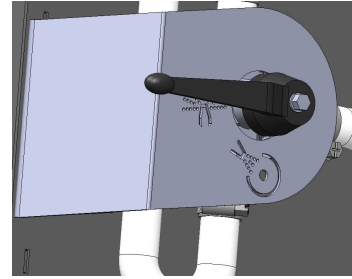
Only use AxioWash for cleaning the cutting chamber.



Note

You do not need to remove the cut-off wheel or the clamping tools while using AxioWash.

1. Open the safety guard.
2. Move the lever to the horizontal position.
3. Close the safety guard.



4. Press the Start button.



The motor starts and water is sprayed through the AxioWash nozzle.

5. Move the handle for the cut-off wheel up and down to optimize the cleaning of the cutting chamber.
6. Press Stop button when you want to stop the cleaning process.
7. Open the safety guard.
8. Move the lever back to the horizontal position.



7.1.3 Cleaning the cooling system

See the Instruction Manual for this unit.

7.1.4 Checking the safety guard



WARNING

The safety guard must be replaced immediately if the protective screen has been weakened by collision with projectile objects or if you see any visible signs of deterioration or damage. Contact Struers Service.

- Visually inspect the safety guard and screen for signs of wear and damage, e.g. dents, cracks or damage to the edge sealing.



Note

Leave the safety guard open when the machine is not in use to let the cutting chamber dry completely. This can prevent corrosion from condensation.

7.1.5 Checking the cut-off wheel guard

Visually inspect that the cut-off wheel guard is intact.

7.1.6 Checking the safety guard lock

You must check the safety guard lock tongue regularly for damage and to make sure that it fits perfectly in the locking mechanism.

- Check the safety guard lock tongue for correct function. It must slide unobstructed into the locking mechanism.

7.2 Weekly

7.2.1 Weekly cleaning

Clean the machine regularly to avoid damaging effects to the machine and the specimens from abrasive grains or metal particles.

1. Clean all painted surfaces and the control panel with a soft damp cloth and common household detergents. For heavy duty cleaning, use a heavy duty cleaning agent such as Solopol Classic.
2. Clean the safety guard with a soft damp cloth and a common household anti-static window cleaning agent. Never use harsh or aggressive cleaning agents.



Note

Make sure that no detergent or cleaning agent is flushed into the cooling unit tank, as this will cause excess foaming.

7.2.2 Cutting chamber

1. Remove the clamping devices.
2. Clean the cutting chamber thoroughly:
 - Clean under the cutting table with the flushing gun and a brush to remove accumulated swarf behind the cutting unit.



Note

Leave the safety guard open to allow the cutting chamber to dry and to avoid corrosion.

7.2.3 Cleaning the clamping devices

1. Clean and lubricate the clamping devices thoroughly.
2. Store the clamping devices in a dry place, or place them on the cutting table after cleaning.

7.2.4 Cooling system

- Check the level of the coolant after 8 hours of use or at least every week.

7.3 Monthly

7.3.1 Replacing the coolant



WARNING

Do not use the machine with non-compatible accessories or consumables.

**CAUTION**

Avoid skin contact with the coolant additive.
Always use goggles or a protective shield, and chemical-resistant gloves.

**CAUTION**

Do not start flushing until the flushing gun points into the cutting chamber.

**Note**

Only use the flushing gun for cleaning inside the cutting chamber.

- Replace the coolant at least once a month.

7.3.2 Maintaining cutting tables

- Replace the stainless steel bands if they are damaged or worn.

7.4 Annually**7.4.1 Inspecting the safety guard****WARNING**

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

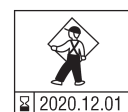
**WARNING**

The safety guard must be replaced immediately if the protective screen has been weakened by collision with projectile objects or if you see any visible signs of deterioration or damage. Contact Struers Service.

**WARNING**

The safety guard screen must be replaced every 5 years to ensure its intended safety. A label on the screen indicates when it must be replaced.

 **Struers**
Safety glass
Sicherheitsglas
Verre sécurit



The safety guard consists of a metal frame and a composite material screen that protects the operator. If the safety guard or screen is damaged, it will be weakened and offer less protection.

7.4.2 Cleaning the nozzle on the flushing gun

1. Unscrew the nozzle on the flushing gun using a shifting spanner.
2. Rinse the nozzle under clean, running water.

7.5 Cut-off wheels



CAUTION

Do not use the machine with non-compatible accessories or consumables.

Cut-off wheels are ordered separately.

7.5.1 Testing cut-off wheels

Cut-off wheels must be tested before use.

Testing an abrasive cut-off wheel for damage

1. Visually inspect the surface for cracks and chips.
2. Mount the cut-off wheel, close the guard and let the wheel rotate with full speed.

If there is no visible damage and the cut-off wheel did not break during the high-speed test, it passed the test. If the cut-off wheel shows cracks, it is unsafe to use and must be replaced.

Testing a diamond/CBN cut-off wheel for damage

1. Let the cut-off wheel hang over your index finger.
2. With a pencil (not metal), gently tap the cut-off wheel around the edge.
3. The cut-off wheel passes the test if it gives a clear metallic tone when tapped. If the cut-off wheel sounds dull or muted, it is cracked and unsafe to use and must be replaced.

7.5.2 Storing conventional cut-off wheels

Conventional cut-off wheels are sensitive to humidity. Therefore, do not mix new, dry cut-off wheels with used humid ones.

Store the cut-off wheels in a dry place, horizontally on a plane support.

7.5.3 Storing diamond and CBN cut-off wheels

Follow these instructions carefully to maintain the precision of diamond and CBN cut-off wheels:

- Never expose the cut-off wheel to a heavy mechanical load or heat.
- Store the cut-off wheel in a dry place, horizontally on a plane support, preferably under light pressure.
- Clean and dry the cut-off wheel before storing to avoid corrosion. Use household detergents for cleaning.
- Dress the cut-off wheel regularly.

7.6 Test the safety devices



WARNING

Do not use the machine with defective safety devices. Testing must be performed at least once a year.
Contact Struers Service.



Note

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

7.6.1 Emergency stop

Test 1

1. Start a cutting process.
2. Press the Emergency stop.
3. The cutting process and coolant stop. The Emergency stop is working correctly.
4. If the cutting process and coolant do not stop, press the Stop button.
5. Do NOT use the machine.
6. Contact Struers Service.



Test 2

1. Press the Emergency stop.
2. Press the Start button.
3. The machine must not be able to start the cutting process or coolant.
4. If the machine or coolant start, press the Stop button.
5. Do NOT use the machine.
6. Contact Struers Service.



7.6.2 Safety guard



WARNING

The safety guard must be replaced every 5 years to ensure its intended safety. A label on the screen indicates when the safety guard is due to be replaced.

The safety guard has a safety switch system to prevent the cut-off wheel from starting while the safety guard is open.

A locking mechanism prevents the operator from opening the safety guard until the cut-off wheel stops spinning.

Testing the safety guard

Test 1

1. Open the safety guard.
2. Make sure that the safety guard stays up in the highest position.
3. If the safety guard does not stay open in the highest position, close the safety guard.
4. Do NOT use the machine.
5. Contact Struers Service.

7.6.3 Safety guard switch

Testing the safety guard switch

Test 1

1. Open the safety guard.
2. Press the Start button.
3. The cutting process and coolant cannot be started.
4. If the cutting process and/or coolant start, press the Stop button.
5. Do NOT use the machine.
6. Contact Struers Service.



7.6.4 Safety guard lock

Test 1

1. Close the safety guard.
2. Press Start. The machine starts the cutting process and coolant.
3. Try to open the safety guard. The safety guard is locked and cannot be opened.
4. If you can open the safety guard while the machine is running, press the Stop button.
5. Do NOT use the machine.
6. Contact Struers Service.



Test 2

1. Close the safety guard.
2. Press Start to start a cutting process. The machine starts the cutting process and coolant.
3. Press the Stop button.
4. The safety guard must remain locked for minimum 4 seconds after pressing the Stop button.
5. If you can open the safety guard before the 4 seconds have passed, close the safety guard again.
6. Do NOT use the machine.
7. Contact Struers Service.

**Test 3**

1. Close the safety guard.
2. Press Start to start a cutting process.
3. Press Stop.

There is a 5 second delay after you press Stop, and until the safety guard unlocks. If you can open the safety guard while the cut-off wheel is still rotating, do NOT use the machine.

4. Contact Struers Service.

**7.6.5 Flushing function****Test 1**

1. Open the safety guard.
2. Press Flush to activate the coolant pump and the flushing gun.
3. If the coolant starts to run from the cut-off wheel guard, press the Stop button.
4. Do NOT use the machine.
5. Contact Struers Service.



8 Spare parts

Technical questions and spare parts

If you have technical questions or when you order spare parts, state the year of production. The year of production is engraved on the cylinder frame.

For further information, or to check the availability of spare parts, contact Struers Service. Contact information is available on [Struers.com](https://www.struers.com).

9 Service and repair

Struers recommends that a general preventive maintenance be carried out once every calendar year or after <6600 cuts. You can see how many cuts have been performed on the motor turn-on counter. See also [Overview ▶ 13](#).



Note

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

Service check

We offer a range of comprehensive maintenance plans to suit the requirements of our customers. This range of services is called ServiceGuard.

The maintenance plans include equipment inspection, replacement of wear parts, adjustments/calibration for optimal operation, and a final functional test.

10 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.



WARNING

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



Note

The recirculation fluid will contain additive and cutting or grinding swarf. Do not dispose of the recirculation fluid into a main drain. Follow the current safety regulations for handling and disposal of swarf and additive for recirculation fluid.

Keep track of which metals you cut or grind and the amount of swarf produced.

Depending on which metals you cut or grind, it is possible that the combination of the metallic swarf from metals with a large difference in electropositivity, can result in exothermic reactions when favorable conditions are present.

Examples:



The following are examples of combinations which can result in exothermic reactions if a large amount of swarf is produced during cutting or grinding on the same machine, and when favorable conditions are present:

- Aluminum and copper.
- Zinc and copper.

11 Troubleshooting

11.1 The machine

Error	Cause	Action
The cut-off wheel does not rotate.	The safety guard is open.	Close the safety guard. If the error remains, contact Struers Service.
	The safety lock has been deactivated.	Reactivate the safety lock release before operating the machine.
	The cutting motor has been overloaded.	Open the safety guard and let the machine cool down for at least 5-10 minutes.
No cooling water	Valve on the rear of the machine is clogged or disconnected.	Make sure that the valve is not clogged or disconnected. If necessary, unscrew the valve and rinse it under running water. If the error remains, contact Struers Service.
	Electrical connection from machine to recirculation unit is open, or the recirculation unit is turned off.	Make sure that the recirculation unit is connected and on.
	The water level in the recirculation unit is low.	Fill coolant in the recirculation unit.

Error	Cause	Action
No water from the flushing gun	The valve is closed.	Open the valve.
	The flushing gun is clogged.	Clean the flushing gun with water and compressed air. If the error remains, contact Struers Service.
Rusty workpieces or cutting chamber	Insufficient additive for the coolant.	Add more additive to the coolant. Make sure to use the correct concentration.
	The machine is left with closed safety guard.	Leave the safety guard open when you are not using the machine to let the cutting chamber dry.
Safety guard blurred	Insufficient cleaning.	Clean with soapy water. <div style="border: 1px solid blue; padding: 5px;">  <p>Note Disconnect the drain pipe to the tank. The soapy water must not run into the recirculation water, as this will cause the water to foam.</p> </div>
Quick clamping device cannot hold the workpiece	The clamping device is not balanced.	Adjust the two clamping column screws.
	Clamping heart worn.	Contact Struers Service.
The laser line does not correspond to the place of cut	The line laser is not aligned with the inner flange.	Adjust it with the 2 screws on the cut-off wheel guard. <div style="border: 1px solid yellow; padding: 5px;">  <p>CAUTION Laser radiation. Do not stare into beam or expose users of telescopic optics. Class 2M laser product.</p> </div>

11.2 Cutting problems

Error	Cause	Action
Discoloration or burning of the workpiece.	The hardness of the cut-off wheel is not appropriate for the hardness / dimensions of the workpiece.	Select another type of cut-off wheel.
	The force on the cut-off-wheel is too high.	Apply a lower force.
	Inadequate cooling.	Make sure that there is enough water in the recirculation cooling unit. Check the flow of water from the recirculation cooling unit.
Unwanted burrs	Cut-off wheel too hard	Select another type of cut-off wheel.
	Too high force on the cut-off wheel near the end of the operation.	Reduce the cutting force near the end of the operation.
	Lack of support.	If possible, support the workpiece on both sides.
The cutting quality is different from time to time	The coolant tube is clogged.	Clean the coolant tube.
	Insufficient coolant.	Refill the tank with water and add the additive.
The cut bends to a side.	Initial cutting rate too fast.	Let the cut-off wheel make a small notch into the workpiece before you make the actual cut.
	The force on the cut-off-wheel is too high.	Apply lower force.

Error	Cause	Action
The cut-off wheel breaks	Incorrect mounting of the cut-off wheel.	<p>Make sure that the hole has the correct diameter.</p> <p>Make sure that there is a cardboard washer on both sides of the cut-off wheel (Conventional cut-off wheels only).</p> <p>Make sure that the nut is tightened securely.</p>
	Incorrect clamping of the workpiece.	<p>Make sure that only one side of the workpiece is clamped securely. The other side should only be fixed lightly.</p> <p>Use support tools if the geometry of the workpiece makes support necessary.</p>
	Not enough support of the workpiece.	Support the free end of the workpiece.
	Cut-off wheel too hard.	Use a softer cut-off wheel.
	The force on the cut-off-wheel is too high.	Apply a lower force on the cut-off wheel.
	Inadequate cooling.	<p>Make sure that there is enough water in the recirculation cooling unit.</p> <p>Check the cooling water hoses.</p>
The cut-off wheel wears down too quickly	The force on the cut-off-wheel is too high.	Apply a lower force on the cut-off wheel.
	The cut-off wheel is too soft for the task.	Select a harder cut-off wheel.
	The machine vibrates.	Contact Struers Service.
The cut-off wheel does not cut through the workpiece	Incorrect choice of cut-off wheel.	Select an appropriate cut-off wheel for your task.
	Cut-off wheel worn.	Replace the cut-off wheel.
	The cut-off wheel gets caught in the workpiece because of internal stress in the workpiece.	<p>Make a relief cut: Cut about halfway through the workpiece.</p> <p>Turn the workpiece 180° and position the cut approx. 1 - 2 mm off-center.</p>

Error	Cause	Action
The cut-off wheel vibrates during cutting.	Incorrect clamping of the workpiece.	Make sure that only one side of the workpiece is clamped securely. The other side should only be fixed lightly. Use support tools if the geometry of the workpiece makes support necessary.
	The cut-off wheel is too soft for the task.	Select a harder cut-off wheel.
	Not enough cutting force.	Exert more force on the cut-off wheel.
	Cutting force too high.	Reduce the force on the cut-off wheel.
	Worn bearings.	Contact Struers Service.
	Certain workpieces can be difficult to clamp adequately and may result in resonance and vibration.	Contact Struers Service.
The workpiece breaks when clamped.	The workpiece is brittle.	Place the workpiece between two polystyrene plates. Always cut brittle workpieces very carefully.
The workpiece is corroded	The workpiece has been left in the cutting chamber for too long.	Leave the safety guard open when you leave the machine.
	Insufficient additive in the coolant.	Make sure that the concentration of additive is correct.
Cutting chamber shows signs of corrosion.	The workpiece is made of Copper/ Copper Alloy.	Use the correct additive for the coolant.

12 Technical data

12.1 Technical data

Capacity	Height x Length	95 x 200 mm (3.7" x 10")
	Diameter	110 mm (4.7")
	Cutting length	305 mm (12")

Cut-off wheel	Diameter	350 mm (14")
	Arbor diameter	32 mm (1.3")
Cut-off wheel motor	Rotational speed	2500 rpm
	Height adjustment of cut-off wheel	–
Cutting table	Width	340 mm (13.4")
	Depth	313 mm (12.3")
	T-slots	T-slot with exchangeable T-slot plates, 10 mm (4 pcs. + 3 pcs.)
	Feed speed	Manual control
Laser		Class 2M
Software and electronics	Controls	Touch pad
	Display	N/A
Safety standards		CE-labeled according to EU directives
REACH		For information about REACH, contact your local Struers office.
Operating environment	Surrounding temperature	5 - 40 °C (41 - 104 °F)
	Humidity	35 - 85 % RH non-condensing
Power supply 1	Voltage/frequency	3 x 200 V (50 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	5.5 kW (7.4 hp)
	Power S3 15 %	7.5 kW (10 hp)
	Current, nominal load	22.9 A
	Current, max.	45.8 A
	Ampere rating of the largest motor or load	21.9 A

Power supply 2	Voltage/frequency	3 x 200 - 210 V (60 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	6.6 kW (8.8 hp)
	Power S3 15 %	8.5 kW (11.4 hp)
	Current, nominal load	27.1 A
	Current, max.	54.2 A
	Ampere rating of the largest motor or load	26.1 A
Power supply 3	Voltage/frequency	3 x 220 - 230 V (50 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	5.5 kW (7.4 hp)
	Power S3 15 %	7.5 kW (10 hp)
	Current, nominal load	20.1 A
	Current, max.	40.2 A
	Ampere rating of the largest motor or load	19.1 A
Power supply 4	Voltage/frequency	3 x 220 - 240 V (60 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	6.6 kW (8.8 hp)
	Power S3 15 %	8.5 kW (11.4 hp)
	Current, nominal load	22.5 A
	Current, max.	45 A
	Ampere rating of the largest motor or load	21.5 A

Power supply 5	Voltage/frequency	3 x 380 - 415V (50 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	5.5 kW (7.4 hp)
	Power S3 15 %	7.5 kW (10 hp)
	Current, nominal load	12 A
	Current, max.	24 A
	Ampere rating of the largest motor or load	11 A
Power supply 6	Voltage/frequency	3 x 380 - 415V (60 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	6.6 kW (8.8 hp)
	Power S3 15 %	8.5 kW (11.4 hp)
	Current, nominal load	13.4 A
	Current, max.	26.8 A
	Ampere rating of the largest motor or load	12.4 A
Power supply 7	Voltage/frequency	3 x 460 - 480 V (60 Hz)
	Power inlet	3L + (N) + PE
	Power S1	N/A
	Power S3 60%	6.6 kW (8.8 hp)
	Power S3 15 %	8.5 kW (11.4 hp)
	Current, nominal load	12.4 A
	Current, max.	24.8 A
	Ampere rating of the largest motor or load	11.4 A
Cooling system	Option	Cooling System 4
Exhaust	Recommended capacity	150 m ³ /h (5300 ft ³ /h) at 0 mm (0") water gauge.

Advanced features	X-table, manual	Option
	X-stand, manual	N/A
	Rotary stand	N/A
Safety Circuit Categories/Performance Level	Emergency stop	PL c, Category 1 Stop category 0
	Safety guard	PL d, Category 3 Stop category 0
	Safety guard lock	PL a, Category B Stop category 0
	Unintended start of recirculation fluid	PL c, Category 1 Stop category 0
Residual Current Circuit Breaker (RCCB)		Type A, 30 mA (or better) is required
Noise level	A-weighted sound emission pressure level at workstations	LpA = 72 dB(A) (measured value). Uncertainty K = 4 dB
Vibration level	Declared vibration emission	$a_{hd} = 0.5 \text{ m/s}^2$ (measured value). Uncertainty K = 0.2 m/s^2
Dimensions and weight	Width (main body)	73 cm (28.9")
	Width (with handle)	89 cm (35.2")
	Width (one tunnel)	Left: 134 cm (52.8") Right: 126 cm (49.4")
	Width (two tunnels)	170 cm (67")
	Depth	94 cm (37.1")
	Height (guard closed, handle included)	90 cm (35.6")
	Height (guard open)	122 cm (48")
	Weight	225 kg (496 lbs)

12.2 Safety Circuit Categories/Performance Level

Safety Circuit Categories/Performance Level	
Emergency stop	PL c, Category 1 Stop category 0
Safety guard	PL d, Category 3 Stop category 0
Safety guard lock	PL a, Category B Stop category 0
Unintended start of fluid	PL c, Category 1 Stop category 0

12.3 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.
Emergency stop	Omron Latching mushroom head	A22NE-M-N	SGC1	2SA10500
Emergency stop	Omron Mounting Latching mushroom head	A22NZ-H-02	SGC1	2SA41700

Safety related part	Manufacturer/Manufacturer description	Manufacturer catalog no.	Electrical ref.	Struers catalog no.
Emergency stop	Omron Switch block 1NC	A22NZ-S-P1BN	SGC1.1 SGC1.3	2SB10111
Safety relay unit	Omron	G9SB-3012-A	KFA3	2KS10006
Motor contactor	Omron	J7KN-40-24VAC	QA4 QA5	2KM74011
Contacteur aux NC	Omron	J73KN-B-01	QA4.1 QA5.1	2KH00137
Safety guard lock	Schmersal Solenoid interlock	AZM161SK-12/12RK-024	KJ1	2SS00121
Magnetic safety sensor	Schmersal	BNS-120-02z	BE1	2SS00130
Power plug-in relay	Omron	G2R-1-S24VAC(S)	KFA1	2KL20124
Solid state multifunctional timer	Omron	H3DS-ML AC/DC	KFB1	2KT00003
Coaxial solenoid valve	ASCO	SCG287A001.24/50	QM1	2YM10046
	AWEMAR (Alternate)	270A0020/10/M0G38 F 2400		2YM10047 (Alternate)
Front window	Struers			16930363
Cut-off wheel guard	Struers			16930275
Extension tunnel	Struers Right side			16930036
Extension tunnel	Struers Left side			16930037

12.4 Diagrams Labotom-20

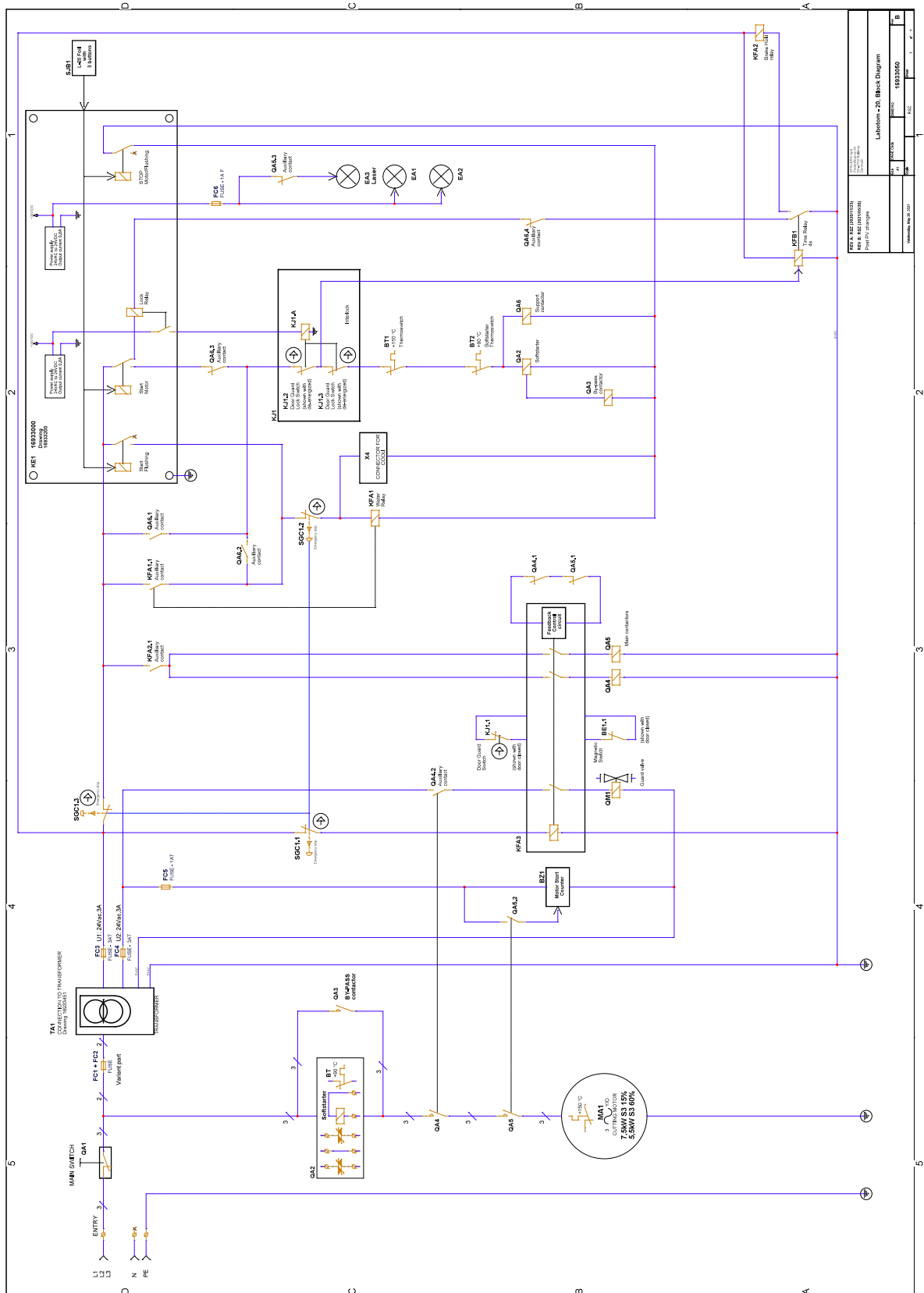


Note

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

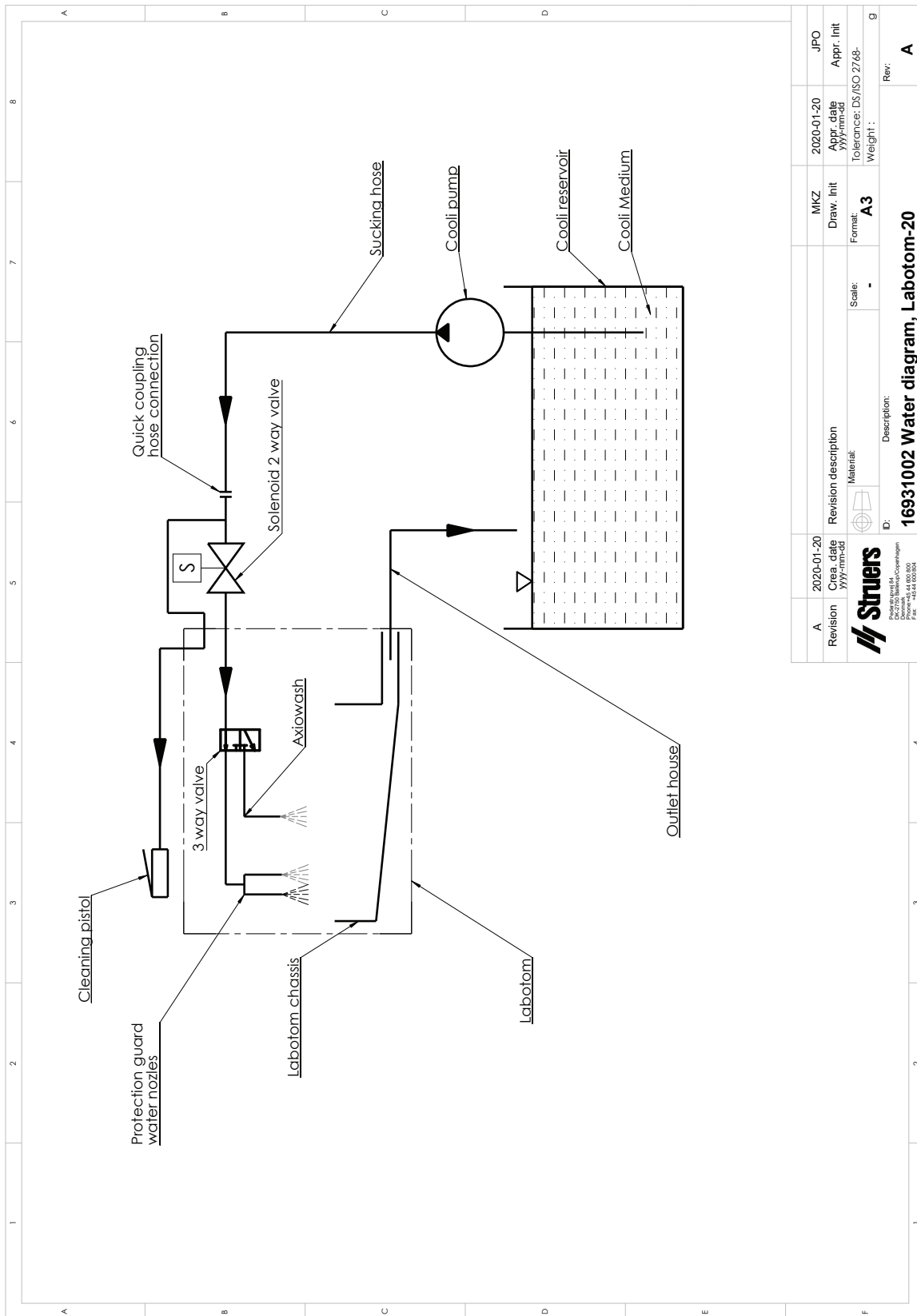
Title Labotom-20	No.
Block diagram	16933050 ▶ 59
Water diagram	16931002 ▶ 60
Safety diagram	16933100 ▶ 61
Circuit diagram	See the diagram number on the type plate of the equipment, and contact Struers Service via Struers.com .

16933050



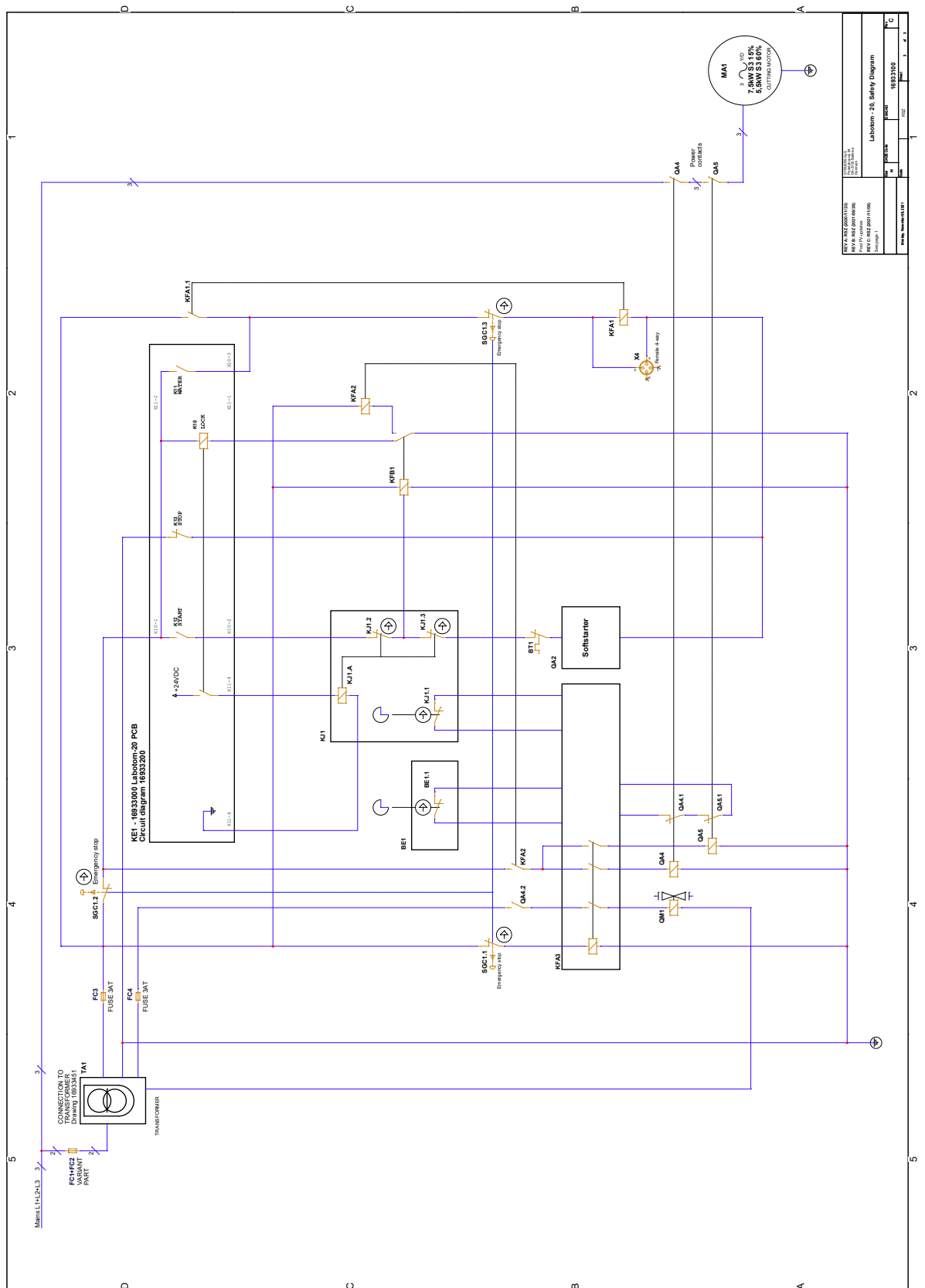
KJ1 KJ2 KJ3		KFE1		KFB	
KJ1.1 KJ1.2 KJ1.3		KFE1.1		KFB.1	
KJ1.4 KJ1.5		KFE1.2		KFB.2	
KJ1.6 KJ1.7		KFE1.3		KFB.3	
KJ1.8 KJ1.9		KFE1.4		KFB.4	
KJ1.10 KJ1.11		KFE1.5		KFB.5	
KJ1.12 KJ1.13		KFE1.6		KFB.6	
KJ1.14 KJ1.15		KFE1.7		KFB.7	
KJ1.16 KJ1.17		KFE1.8		KFB.8	
KJ1.18 KJ1.19		KFE1.9		KFB.9	
KJ1.20 KJ1.21		KFE1.10		KFB.10	
KJ1.22 KJ1.23		KFE1.11		KFB.11	
KJ1.24 KJ1.25		KFE1.12		KFB.12	
KJ1.26 KJ1.27		KFE1.13		KFB.13	
KJ1.28 KJ1.29		KFE1.14		KFB.14	
KJ1.30 KJ1.31		KFE1.15		KFB.15	
KJ1.32 KJ1.33		KFE1.16		KFB.16	
KJ1.34 KJ1.35		KFE1.17		KFB.17	
KJ1.36 KJ1.37		KFE1.18		KFB.18	
KJ1.38 KJ1.39		KFE1.19		KFB.19	
KJ1.40 KJ1.41		KFE1.20		KFB.20	
KJ1.42 KJ1.43		KFE1.21		KFB.21	
KJ1.44 KJ1.45		KFE1.22		KFB.22	
KJ1.46 KJ1.47		KFE1.23		KFB.23	
KJ1.48 KJ1.49		KFE1.24		KFB.24	
KJ1.50 KJ1.51		KFE1.25		KFB.25	
KJ1.52 KJ1.53		KFE1.26		KFB.26	
KJ1.54 KJ1.55		KFE1.27		KFB.27	
KJ1.56 KJ1.57		KFE1.28		KFB.28	
KJ1.58 KJ1.59		KFE1.29		KFB.29	
KJ1.60 KJ1.61		KFE1.30		KFB.30	
KJ1.62 KJ1.63		KFE1.31		KFB.31	
KJ1.64 KJ1.65		KFE1.32		KFB.32	
KJ1.66 KJ1.67		KFE1.33		KFB.33	
KJ1.68 KJ1.69		KFE1.34		KFB.34	
KJ1.70 KJ1.71		KFE1.35		KFB.35	
KJ1.72 KJ1.73		KFE1.36		KFB.36	
KJ1.74 KJ1.75		KFE1.37		KFB.37	
KJ1.76 KJ1.77		KFE1.38		KFB.38	
KJ1.78 KJ1.79		KFE1.39		KFB.39	
KJ1.80 KJ1.81		KFE1.40		KFB.40	
KJ1.82 KJ1.83		KFE1.41		KFB.41	
KJ1.84 KJ1.85		KFE1.42		KFB.42	
KJ1.86 KJ1.87		KFE1.43		KFB.43	
KJ1.88 KJ1.89		KFE1.44		KFB.44	
KJ1.90 KJ1.91		KFE1.45		KFB.45	
KJ1.92 KJ1.93		KFE1.46		KFB.46	
KJ1.94 KJ1.95		KFE1.47		KFB.47	
KJ1.96 KJ1.97		KFE1.48		KFB.48	
KJ1.98 KJ1.99		KFE1.49		KFB.49	
KJ1.100 KJ1.101		KFE1.50		KFB.50	

16931002



Revision	2020-01-20	Revision description	MKZ	2020-01-20	JPO
Creation date	2020-01-20	Material	Draw. Init	Appr. date	Appr. Init
		Material	Format	Tolerance: DS/ISO 2768-	Weight:
ID: 16931002 Water diagram, Labotom-20		Scale:	A3	Rev:	A

16933100



12.5 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.

13 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.

Declaration of Conformity

Manufacturer	Struers ApS • Pederstrupvej 84 • DK-2750 Ballerup • Denmark
Name	Labotom-20
Model	N/A
Function	Cut-off machine
Type	693
Cat. no.	Machine without tunnels 06936129, 06936130, 06936135, 06936136, 06936146, 06936147, 06936154 Machine with tunnels 06936229, 06936230, 06936235, 06936236, 06936246, 06936247, 06936254 Tunnels 06936901, 06936902

Serial no.



Module H, according to global approach



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 13849-1:2015, EN ISO 13849-2:2012, EN ISO 13850:2015, EN ISO 16089:2015, EN 60204-1:2018, EN 60204-1-2018/Corr.:2020
2011/65/EU	EN 63000:2018
2014/30/EU	EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61000-3-11:2001, EN 61000-3-12:2012, EN 61000-6-2:2005, EN 61000-6-2:2005/Corr.:2005, EN 61000-6-3:2007, EN 61000-6-3-A1:2011, EN 61000-6-3-A1-AC:2012
Additional standards	NFPA 79, FCC 47 CFR Part 15 Subpart B

Authorized to compile technical file/
Authorized signatory

Date: [Release date]

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