

LaboPol-20

Instruction Manual

Original Instructions



CE

Doc. no.: 16327025-02_A_en-us
Date of release: 2023.03.02

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 LaboPol-20 safety precautions	7
2.2.1 Read carefully before use	7
2.3 Safety messages	8
2.4 Safety messages in this manual	9
3 Getting started	11
3.1 Device description	11
3.2 LaboPol-20 - Front view	11
3.2.1 Control panel/Specimen mover	12
3.3 LaboPol-20 - Rear view	13
3.4 Struers knowledge	13
3.5 Accessories and consumables	13
4 Transport and storage	14
4.1 Transport	14
4.2 Long-term storage or shipping	14
5 Installation	15
5.1 Unpack the machine	15
5.2 Check the packing list	15
5.3 Lift the machine	16
5.4 Location	17
5.5 Power supply	17
5.5.1 Single-phase supply	18
5.5.2 2-phase supply	18
5.5.3 Connection to the machine	18
5.6 Water supply and water outlet	18
5.6.1 Connecting to the water supply	18
5.6.2 Connecting to the waste water outlet	19
5.7 Installing the preparation disc	19
5.7.1 Preparation disc types	19
5.8 Noise	19
5.9 Vibration	20

6 LaboUI	21
6.1 Installation	21
6.1.1 Unpack the machine	21
6.1.2 Check the packing list	21
6.1.3 Installation - LaboUI	21
6.2 Operate the device	22
6.2.1 Control panel functions	22
6.2.2 Water tap	23
6.2.3 The spin function	23
6.2.4 The splash guard	24
6.2.5 Manual preparation	24
6.2.6 Starting and stopping the machine	24
7 LaboForce-50	26
7.1 Installation	27
7.1.1 Unpack the machine	27
7.1.2 Check the packing list	27
7.1.3 Installation - LaboForce-50	27
7.1.4 Adjusting the specimen mover	28
7.2 Operate the device	30
7.2.1 Control panel functions	30
7.2.2 Water tap	31
7.2.3 The spin function	32
7.2.4 The splash guard	32
7.2.5 Inserting a specimen	32
7.2.6 Adjusting the force	33
7.2.7 Manual preparation	33
7.2.8 Starting and stopping the machine	34
7.2.9 Removing the specimens	36
7.2.10 Changing the specimen mover plate	36
8 LaboDoser-10	36
8.1 Unpack the machine	37
8.2 Check the packing list	38
8.3 Installation	38
8.4 Operating LaboDoser-10	39
8.5 Changing lubricant/suspension	39
9 Maintenance and service	40
9.1 General cleaning	40
9.2 Daily	40
9.3 Weekly	40

9.4	Monthly	41
9.4.1	LaboForce-50 - pressure feet	41
9.5	Annually	41
9.5.1	Test the safety devices	41
9.5.2	Emergency stop	42
9.6	Spare parts	42
9.7	Service and repair	43
9.8	Disposal	43
10	Troubleshooting	44
10.1	Troubleshooting - LaboPol-20	44
10.2	LaboForce-50	44
11	Technical data	45
11.1	Technical data	45
11.2	Safety Circuit Categories/Performance Level	46
11.3	Noise and vibration levels	47
11.4	Technical data - equipment units	47
11.5	Safety Related Parts of the Control System (SRP/CS)	47
11.6	Diagrams	48
11.6.1	Diagrams - LaboPol-20	48
11.6.2	Diagrams - equipment units	51
11.7	Legal and regulatory information	51
12	Manufacturer	51
	Declaration of Conformity	53

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 wish to view specific information in detail, see the online version of this manual.

2 Safety

2.1 Intended use

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

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

The machine is for professional manual or semi-automatic materialographic preparation (grinding or polishing) of materials for further materialographic inspection.

The machine must be operated only by skilled/trained personnel.

Manual preparation

LaboPol-20 is intended to be used in combination with:

- LaboUI

Semi-automatic preparation

LaboPol-20 is intended to be used in combination with:

- LaboForce-50

Do not use the machine for the following

Preparation (grinding or polishing) of materials other than solid materials suitable for materialographic studies.

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.

Model

LaboPol-20

2.2 LaboPol-20 safety precautions



2.2.1 Read carefully before use

In combination with: LaboUI, LaboForce-50.

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

Specific safety precautions - residual risks

1. The operator must read the Instruction Manual and, where applicable, the Safety Data Sheets for the applied consumables.
2. 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.
3. Connect the machine to a cold water tap. Make sure that the water connections are leak-proof and that the water outlet is working.
4. Keep clear of rotating parts during operation. When you perform manual grinding or polishing, be careful not to touch the disc. Do not try to collect a specimen from the tray while the disc is rotating.
5. Wear suitable gloves to protect fingers from abrasives and warm/sharp specimens.
6. 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.
7. 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.
8. Risk of hand to arm vibration during manual preparation. Prolonged exposure to vibration may cause discomfort, joint damage or even neurological damage.
9. The machine must be disconnected from the electrical power supply before any service. Wait 5 minutes until residual potential on the capacitors is discharged.
10. 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.

General safety precautions

1. 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.
2. The operator must read the safety precautions and Instruction Manual, as well as relevant sections of the manuals for any connected equipment and accessories.
3. This machine must be operated and maintained only by skilled/trained personnel.
4. The machine must always be used with the splash guard in place.
5. Make sure that the actual electrical power supply voltage corresponds to the voltage stated on the type 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.

6. Struers recommends that the main water supply is shut off or disconnected if the machine is to be left unattended.
7. Consumables: only use consumables specifically developed for use with this type of materialographic machine. Alcohol-based consumables: follow the current safety rules for handling, mixing, filling, emptying and disposing of alcohol-based liquids.
8. If you observe malfunctions or hear unusual noises, switch off the machine and call technical service.
9. Do not switch the machine on and off more than once every five minutes. Damage to the electrical components could occur.
10. In case of fire, alert bystanders and the fire brigade. Disconnect the electrical power supply. Use a powder fire extinguisher. Do not use water.
11. Struers equipment must only be used in connection with and as described in the Instruction Manual supplied with the equipment.
12. The equipment is designed to be used only with Struers consumables specifically designed for this purpose and this type of machine.
13. 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.
14. 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.



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 Safety messages in this manual**WARNING**

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

**CRUSHING HAZARD**

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

**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 type plate of the machine.
Incorrect voltage can damage the electrical circuit.

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



CAUTION

Keep clear of rotating parts during operation.



CAUTION

When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts.



CAUTION

For manual preparation use the switch on the side of the specimen mover head to disable rotation of LaboForce-50.



CAUTION

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



CAUTION

When you perform manual grinding or polishing, be careful not to touch the disc.



CAUTION

Do not try to collect a specimen from the tray while the disc is rotating.



CAUTION

When the disc is rotating, make sure your hands are kept completely clear of its periphery and out of the splash bowl.



WARNING

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



WARNING

Before you release the emergency stop, investigate the reason for activating the emergency stop and take any necessary corrective action.



WARNING

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

3 Getting started

3.1 Device description

LaboPol-20 is for materialographic preparation (grinding/polishing) using a preparation disc of 200 mm in diameter.

LaboPol-20 is for manual preparation when used with LaboUI.

LaboPol-20 is for semi-automatic preparation when used with LaboForce-50.

The operator selects the grinding/polishing surface and the cooling fluid/abrasive suspension to be applied.

Cooling water is applied when the operator opens the water tap. Other fluids are applied manually or by a separate dosing unit.

With LaboUI the operator holds the specimens during the preparation.

With LaboForce-50 the operator places the specimens in the specimen mover plate.

The operator sets the rotation speed of the preparation disc before starting the process.

The machine must always be used with the splash guard in place.

The splash guard for manual preparation is supplied with the machine.

The splash guard for other types of preparation must be ordered separately.

The operator starts the machine by pressing the Start button on the control panel.

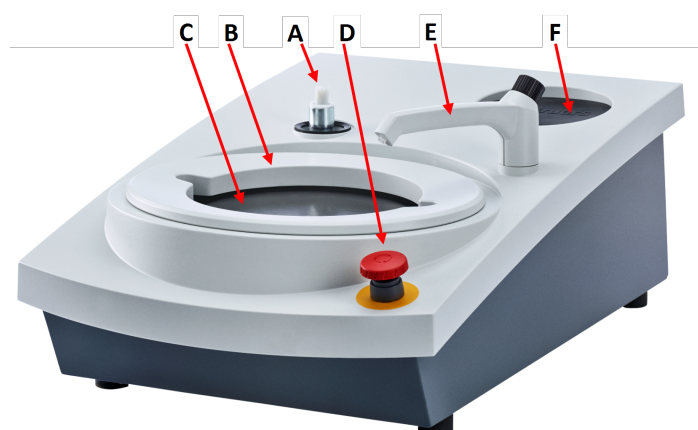
The operator stops the machine by pressing stop on the control panel.

The operator cleans the specimens before the next preparation step or inspection.

We recommend that an exhaust system is applied when alcohol-based suspension or lubricants are used.

If the emergency stop is activated, the power to all moving parts is cut.

3.2 LaboPol-20 - Front view



- A** Connection for control panel
- B** Splash guard for manual preparation (both discs)
- C** Preparation disc location (both discs)
- D** Emergency stop
- E** Water tap
- F** Storage pad



Emergency stop

If LaboForce-50 is mounted on the machine, activating the emergency stop on the machine will also stop LaboForce-50.



Note

Do not use the emergency stop for operational stop of the machine during normal operation.

Before you release the emergency stop, investigate the reason for activating the emergency stop and take any necessary corrective action.

- To activate the emergency stop, press the red emergency stop button.
- To release the emergency stop, turn the red emergency stop button clockwise.

3.2.1 Control panel/Specimen mover

The machine can be mounted with one of the following units. See the specific sections for installation instructions.



LaboUI

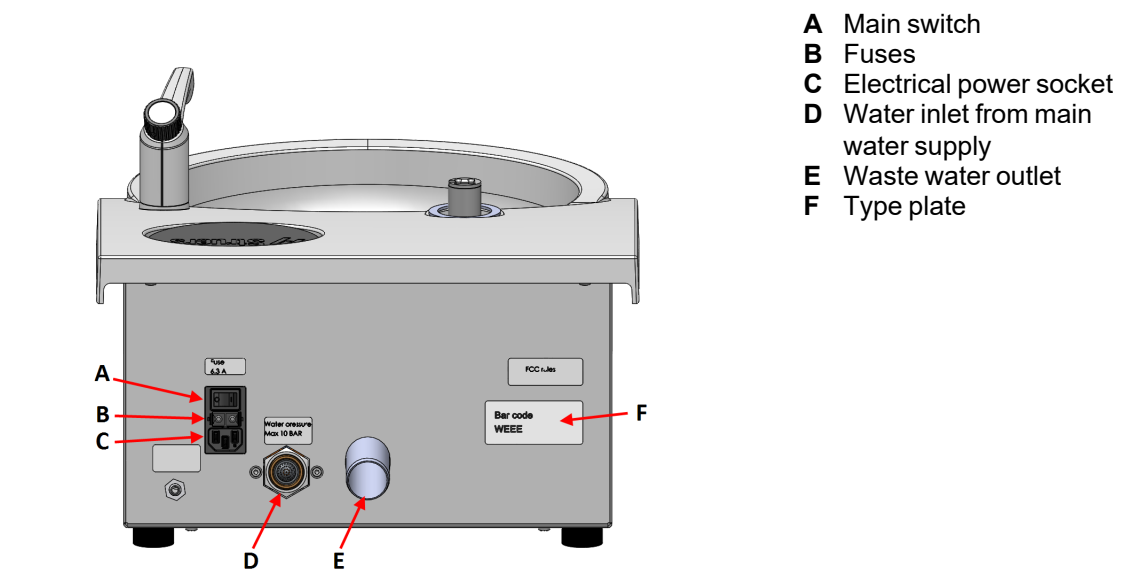
- See [Control panel functions ▶22](#).



LaboForce-50

- See [Control panel functions ▶30](#).

3.3 LaboPol-20 - Rear view



- A Main switch
- B Fuses
- C Electrical power socket
- D Water inlet from main water supply
- E Waste water outlet
- F Type plate

3.4 Struers knowledge

Mechanical preparation is the most common method of preparing materialographic specimens for microscopic examination.

The specific requirement of the prepared surface is determined by the particular type of analysis or examination.

Specimens can be prepared to the perfect finish, the true structure, or the preparation can be stopped when the surface is acceptable for a specific examination.



Hint

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

3.5 Accessories and consumables

Accessories

For information about the available range, see:

- [The LaboSystem brochure](https://www.struers.com/Products/Grinding-and-Polishing/Grinding-and-polishing-equipment/LaboSystem) (https://www.struers.com/Products/Grinding-and-Polishing/Grinding-and-polishing-equipment/LaboSystem)

Consumables

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.

For information about the available range, see:

- [The Struers Consumables Catalogue](https://www.struers.com) (via <https://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.

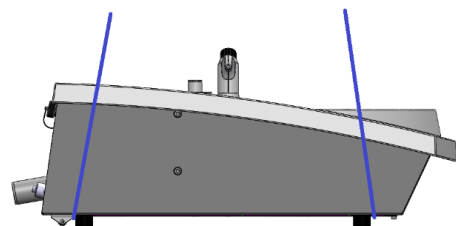
- Package the unit securely before transportation. Insufficient packaging could cause damage to the unit and will void the warranty. Contact Struers Service.
- We recommend that you use the original packaging and fittings.

4.1 Transport

- Disconnect the unit from the electrical power supply.
- Disconnect the water inlet and the water outlet.
- Remove the splash guard, the preparation disc and the bowl liner.
- Lift the machine by gripping the base of the machine from beneath, from both the left side and the right side.



- Alternatively, use a crane and two lifting straps to lift the machine.
- Position the straps under the machine, so that they are on the outer side of the feet.



- Lift the machine onto a stable surface.

4.2 Long-term storage or shipping



Note

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

- Clean the machine and all accessories thoroughly.
- Disconnect the unit from the electrical power supply.
- Disconnect the water inlet and the water outlet.
- Remove the splash guard, the preparation disc and the bowl liner.
- Remove the control panel or specimen mover.
- Remove any accessories.
- Lift the machine by gripping the base of the machine from beneath, from both the left side and the right side.
- Place the machine and accessories in their original packaging.
- Secure the boxes on a pallet with straps.

At the new location

At the new location, make sure that the facilities required are in place.

5 Installation

5.1 Unpack the machine



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. Remove the loose parts.
3. Remove the unit from the box.

5.2 Check the packing list

Optional accessories may be included in the packing box.

The packing box contains the following items:

Pcs.	Description
1	LaboPol-20
2	Electrical power supply cables
1	Disposable bowl liner, clear plastic
1	Splash guard for manual preparation
1	Water inlet hose. Diameter: 19 mm/¾". Length: 2 m/6.6'

Pcs.	Description
1	Filter gasket
1	Reduction ring with gasket, 3/4" to 1/2"
1	Water outlet hose. Diameter: 32 mm/1.6". Length: 1.5 m/4.9'
1	Elbow pipe for water outlet
1	Hose clamp
1	Allen key with cross handle, 6x150 mm/0.23x6"
2	Caps for use after mounting LaboUI, or LaboForce-50
1	Instruction Manual set

5.3 Lift the machine



CRUSHING HAZARD

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



Note

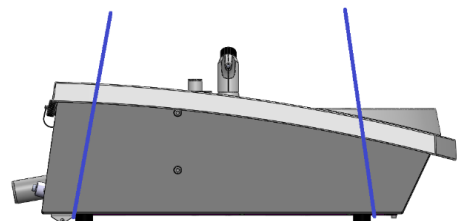
Do not lift the machine by the light gray top part or by the water tap.
Always lift the machine from beneath.

Weight	
LaboPol-20	22 kg (49 lbs)

- Lift the machine by gripping the base of the machine from beneath, from both the left side and the right side.



- Alternatively, use a crane and two lifting straps to lift the machine.
- Position the straps under the machine, so that they are on the outer side of the feet.



2. Lift the machine onto the table.
3. The machine must rest securely with all 4 feet on the table.

5.4 Location



CRUSHING HAZARD

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

- The machine must be placed close to the electrical power supply, main water supply and waste water drain.
- To facilitate easy access for service technicians, allow sufficient space around the machine.
- 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 level the machine, turn the adjustable rubber feet.

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 type plate of the machine.
Incorrect voltage can damage the electrical circuit.



Note

An autotransformer is required in countries with a 110 V electrical power supply.

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.

5.5.1 Single-phase supply

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)
Brown	Line (live)
Blue	Neutral

5.5.2 2-phase supply

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

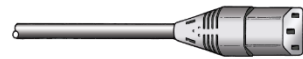


The leads must be connected as follows:

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

5.5.3 Connection to the machine

- Connect the electrical power cable to the machine (C14 IEC 320 connector).
- Connect the cable to the electrical power supply.



5.6 Water supply and water outlet

Water for wet grinding is supplied from the main water supply.

5.6.1 Connecting to the water supply



Note

The cold-water supply must have a head pressure in the range: 1-9.9 bar (14.5-143 psi)



Hint

New water pipe installations:
Leave the water to run for a few minutes to flush any debris from the pipe before connecting the machine to the water supply.

Connecting the water inlet hose

Connect the 90°-angle end of the water inlet hose to the water inlet on the back of the machine:

1. Insert the filter gasket in the coupling nut with the flat side against the water inlet hose.
2. Tighten the coupling nut firmly.

Connect the straight end of the water inlet hose to the water supply tap for cold water:

1. If needed, connect the reduction piece with gasket to the water supply tap.
2. Tighten the coupling nut firmly.

5.6.2 Connecting to the waste water outlet

1. Connect the elbow pipe to the waste water outlet pipe.
2. Connect the waste water outlet hose to the elbow pipe. If needed, lubricate with grease or soap to make it easier to insert the pipe in the hose. Use a hose clamp to fasten the hose to the pipe.
3. Lead the other end of the waste water hose to the waste water drain. If needed, shorten the hose.



Note

Make sure that the hose slopes downward towards the waste water drain throughout its entire length.
Make sure that there are no sharp bends in the waste water hose.

5.7 Installing the preparation disc



Note

Make sure that the cavity on the underside of the preparation disc and the cone on the machine are clean.
Make sure that the bowl liner is clean and that the drain is positioned correctly.

Procedure

1. Place the preparation disc carefully on the driving pin.
2. Rotate it slowly until it is safely engaged.

5.7.1 Preparation disc types

The machine can be used with the following disc types:

Preparation disc types	Preparation surface
MD-Disc	For MD consumable.
Wet grinding disc	For SiC Paper.
Aluminum disc	For adhesive-backed consumable.

5.8 Noise

For information on the sound pressure level value, see this section: [Technical data](#) ► 45



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.

How to handle noise during operation

Different materials have different noise characteristics.

Manual preparation

To lower the noise, try to decrease the force with which the specimen is pressed against the preparation surface. The processing time may increase.

Semi-automatic preparation

To lower the noise, decrease the rotational speed and/or the force with which the specimens are pressed against the preparation surface. The processing time may increase.

5.9 Vibration

For information on the total vibration exposure to hand and arm, see this section: [Technical data](#)
▶ 45.



CAUTION

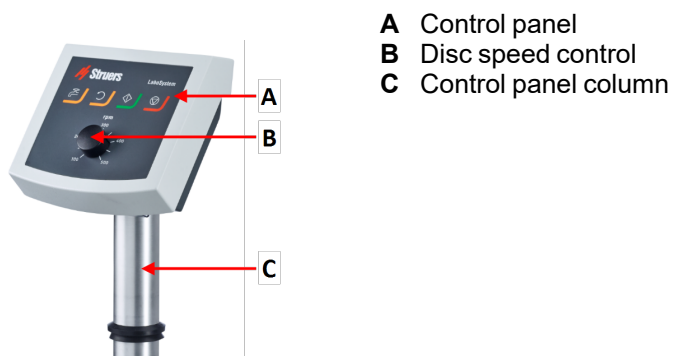
Risk of hand to arm vibration during manual preparation.
Prolonged exposure to vibration may cause discomfort, joint damage or even neurological damage.

How to handle vibration during operation

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

6 LaboUI

Front view



6.1 Installation

6.1.1 Unpack the machine



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. Remove the loose parts.
3. Remove the unit from the box.

6.1.2 Check the packing list

Optional accessories may be included in the packing box.

The packing box contains the following items:

Pcs.	Description
1	LaboUI
1	Instruction Manual set

6.1.3 Installation - LaboUI



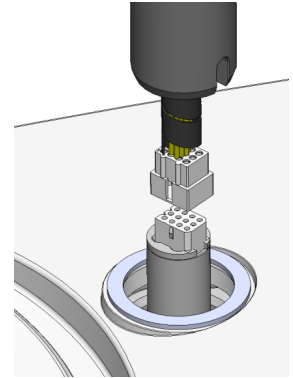
Note

This device must be mounted securely on the machine.

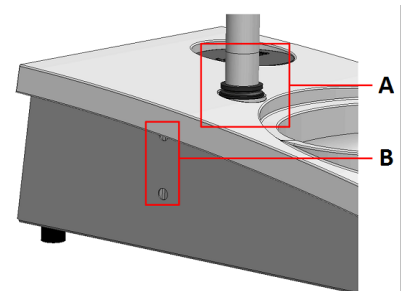
Procedure

Install the control panel in the connection hole of the machine.

1. Remove the plastic disc protecting the communication cable.
2. Connect the communication cable on the column to the connection port on the machine.
3. Guide the column down into the connection hole.



4. Slide the black V-ring down the column until it covers the connection hole.
5. Use the Allen key to tighten the two fastening screws. Do not tighten the screws completely.
6. Cover the holes with the two cover caps.
Allen key and cover caps are supplied with LaboPol.



A V-ring
B Fastening screws

6.2 Operate the device

6.2.1 Control panel functions



CAUTION

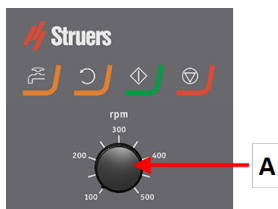
Keep clear of rotating parts during operation.







CAUTION

When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts.

A Disc speed control



Button	Function
	<p>Disc rotation</p> <ul style="list-style-type: none"> Starts rotation of the disc (Spin function).
	<p>Water</p> <p>Manual override</p> <ul style="list-style-type: none"> Press the button to apply water. Water is applied when no process is running. Press the button again to stop applying water.
	<p>Start</p> <ul style="list-style-type: none"> Starts the preparation process.
	<p>Stop</p> <ul style="list-style-type: none"> Stops the preparation process.

6.2.2 Water tap

Apply water automatically

Water is applied when a process is running.

- During grinding, open the nozzle on the water tap to apply water.
- During polishing, close the nozzle on the water tap.



Note

Close the water tap before you start a polishing process.

For optimal results and to avoid splashing, position the water tap between the center and the left edge of the polishing disc.

Apply water manually

- To start applying water, press the **Water** button and open the water tap.
- To stop applying water, press the **Water** button or close the water tap.



6.2.3 The spin function

Only use the spin function to rotate the preparation disc at high speed

- to remove water from the surface of the disc.
- to remove water from an MD-Disc or a SiC Foil/SiC Paper before you remove it,

- to dry an MD-Disc or an MD-Chem cloth
- To start the spin function, press and hold the **Disc rotation** button.
- To stop the spin function, release the **Disc rotation** button.



6.2.4 The splash guard

Manual preparation

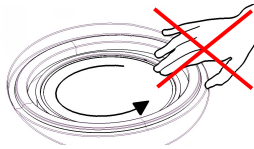
- The splash guard for manual preparation is supplied with the machine.

Wet grinding (for plain-back SiC Paper)

- Use the splash guard for the Wet Grinding Disc.

6.2.5 Manual preparation

When you perform manual preparation, you hold the specimen in your hand and press it firmly onto and across the preparation surface.



CAUTION

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



CAUTION

When you perform manual grinding or polishing, be careful not to touch the disc.



CAUTION

Do not try to collect a specimen from the tray while the disc is rotating.



CAUTION

When the disc is rotating, make sure your hands are kept completely clear of its periphery and out of the splash bowl.

6.2.6 Starting and stopping the machine

Start the machine



WARNING

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

**CAUTION**

When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts.

**CAUTION**

Keep clear of rotating parts during operation.

**Note**

We recommend that an exhaust system is applied when alcohol-based suspension or lubricants are used.

1. Set the speed control to the desired disc speed.
2. Press the **Start** button. The machine starts operating.
3. If needed, adjust the disc speed.

**Stopping the machine**

- Press the **Stop** button.

**Emergency stop****Note**

Activating the emergency stop on the machine will stop all movable parts.

**Note**

Do not use the emergency stop for operational stop of the machine during normal operation.

1. Press the emergency stop button to activate an emergency stop.

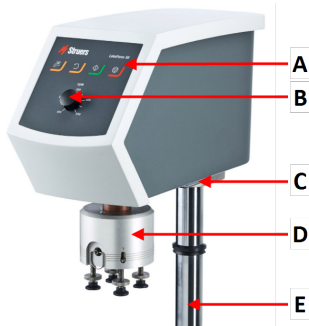
**WARNING**

Before you release the emergency stop, investigate the reason for activating the emergency stop and take any necessary corrective action.

2. Turn the emergency stop button to release the emergency stop.

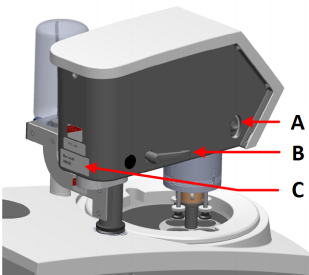
7 LaboForce-50

Front view



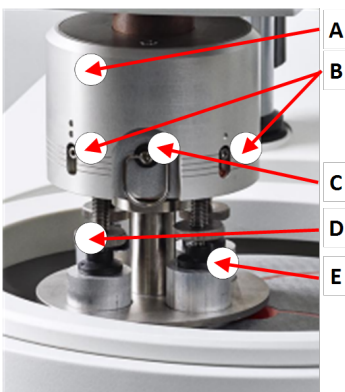
- A Control panel
- B Disc speed control
- C LED light (not shown)
- D Specimen mover head
- E Control panel column

Rear view



- A Rotation switch (Specimen mover head)
- B Locking handle
- C Type plate

The specimen mover



- A Housing
- B Force indicators
- C Quick release ring
- D Force adjustment screw
- E Pressure feet

7.1 Installation

7.1.1 Unpack the machine



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. Remove the loose parts.
3. Remove the unit from the box.

7.1.2 Check the packing list

Optional accessories may be included in the packing box.

The packing box contains the following items:

Pcs.	Description
1	LaboForce-50
1	Spacer and 2 M4 screws for mounting on LaboPol-30 and LaboPol-60
1	Spacing disc
1	Allen key for mounting the specimen mover plate
1	Instruction Manual set

7.1.3 Installation - LaboForce-50



Note

This device must be mounted securely on the machine.



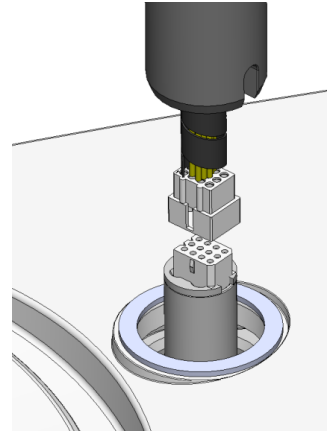
Note

Do not use the speed control knob on the control panel to move the specimen mover.

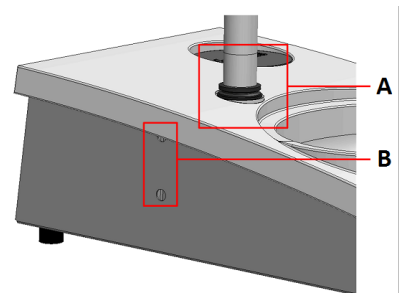
Procedure

Install the specimen mover in the connection hole of the machine.

1. Remove the plastic disc protecting the communication cable.
2. Connect the communication cable on the column to the connection port on the machine.



3. Guide the column down into the connection hole.
4. Slide the black V-ring down the column until it covers the connection hole.
5. Use the Allen key to tighten the two fastening screws. Do not tighten the screws completely.



- A** V-ring
- B** Fastening screws

7.1.4 Adjusting the specimen mover

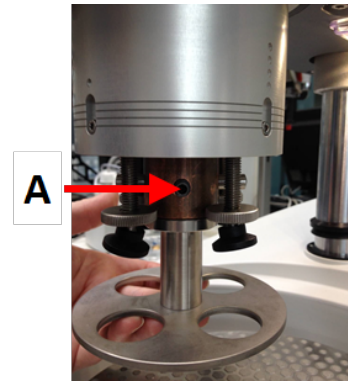
Insert a specimen mover plate

Before you adjust the specimen mover, you must insert a specimen mover plate.

For approved specimen mover plates, see:

- [The LaboSystem brochure](https://www.struers.com/Products/Grinding-and-Polishing/Grinding-and-polishing-equipment/LaboSystem) (https://www.struers.com/Products/Grinding-and-Polishing/Grinding-and-polishing-equipment/LaboSystem)

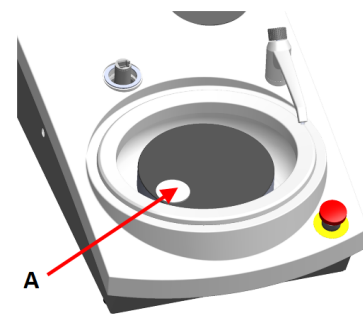
1. Use the locking handle on the left side to unlock the specimen mover and let it move into upright position.
2. Pull the quick-release ring and lift the housing.
3. Insert a specimen mover plate and rotate it until the two pins are aligned with the holes in the specimen mover.
4. Push the specimen mover plate upwards and use the Allen key to tighten the screw to secure it in position. See **A**.
5. Make sure that the specimen mover plate is securely mounted.
6. Lower the housing back into position.



A Screw

Adjust the height of the specimen mover plate

1. Use the locking handle on the left side to unlock the specimen mover and let it move into upright position.
2. Select the 'thickest' preparation surface to be used and place it on the preparation disc. Usually, this will be SiC Foil on an MD-Gekko disc, or SiC Paper on an MD-Fuga disc, or an MD-Alto.
3. Place the supplied spacing disc on the preparation surface.
4. Support the specimen mover head and loosen the 2 fastening screws that hold the column.
5. Lift and support the specimen mover.
6. Press the specimen mover head down as far as possible.
7. Use the locking handle to lock the specimen mover head in operating position.
8. Lower the column until the specimen mover plate rests on the spacing disc.
9. Adjust the horizontal position of the specimen mover plate.

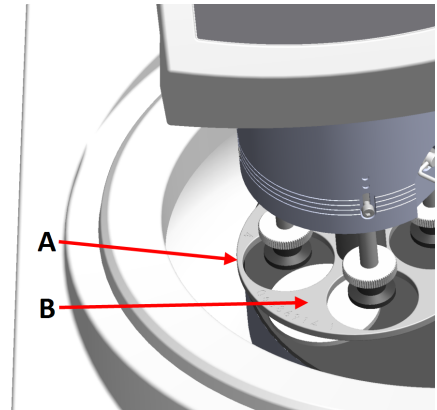


A Spacing disc

Adjusting the horizontal position of the specimen mover plate

MD-Disc

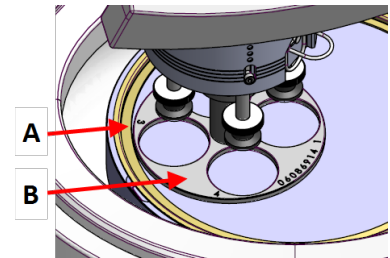
1. Moves the specimen mover head to the right.
2. Place the specimen mover plate in a position that allows the specimen to run 3 – 4 mm over the edge of the preparation disc.



A Disc edge
B Specimen mover plate

Wet Grinding Disc

1. Moves the specimen mover head to the right.
2. Place the specimen mover plate in a position 2 – 3 mm from the metal ring.



A Metal ring
B Specimen mover plate

Complete the adjustment

1. Tighten the 2 fastening screws firmly. The specimen mover will now remain in position.
2. Cover the holes with the two caps.
Allen key and cover caps are included in the package.

7.2 Operate the device

7.2.1 Control panel functions

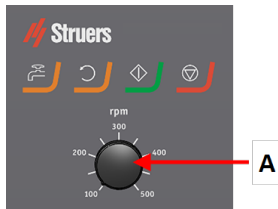






CAUTION

Keep clear of rotating parts during operation.

**CAUTION**

When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts.

A Disc speed control

Button	Function
	Disc rotation <ul style="list-style-type: none"> Starts rotation of the disc (Spin function).
	Water Manual override <ul style="list-style-type: none"> Press the button to apply water. Water is applied when no process is running. Press the button again to stop applying water.
	Start <ul style="list-style-type: none"> Starts the preparation process.
	Stop <ul style="list-style-type: none"> Stops the preparation process.

7.2.2 Water tap

Apply water automatically

Water is applied when a process is running.

- During grinding, open the nozzle on the water tap to apply water.
- During polishing, close the nozzle on the water tap.

**Note**

Close the water tap before you start a polishing process.

For optimal results and to avoid splashing, position the water tap between the center and the left edge of the polishing disc.

Apply water manually

- To start applying water, press the **Water** button and open the water tap.
- To stop applying water, press the **Water** button or close the water tap.

**7.2.3 The spin function**

Only use the spin function to rotate the preparation disc at high speed

- to remove water from the surface of the disc.
 - to remove water from an MD-Disc or a SiC Foil/SiC Paper before you remove it,
 - to dry an MD-Disc or an MD-Chem cloth
-
- To start the spin function, press and hold the **Disc rotation** button.
 - To stop the spin function, release the **Disc rotation** button.

**7.2.4 The splash guard****Manual preparation**

- The splash guard for manual preparation is supplied with the machine.

Semi-automatic preparation

- Use the splash guard for semi-automatic preparation.

Wet grinding (for plain-back SiC Paper)

- Use the splash guard for the Wet Grinding Disc.

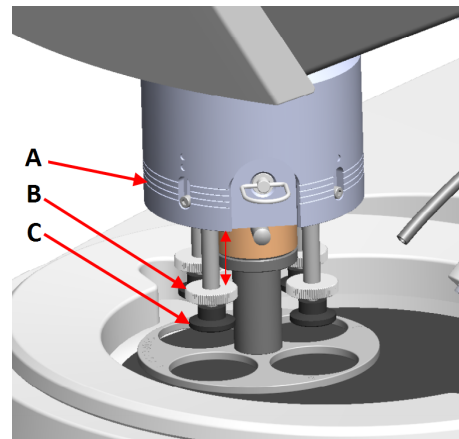
7.2.5 Inserting a specimen

1. Lift the pressure feet on the force adjustment screw to make room for the specimen.
2. Place the specimen in one of the holes of the specimen mover plate and lower the pressure feet. Each position is marked for easy identification of the individual specimen.

For taller specimens

1. Pull the quick-release ring and lift the housing.
2. Lift the pressure feet up as far as possible.
3. Lower the housing back into position.

- A** Force indicator
B Force adjustment screw
C Pressure foot

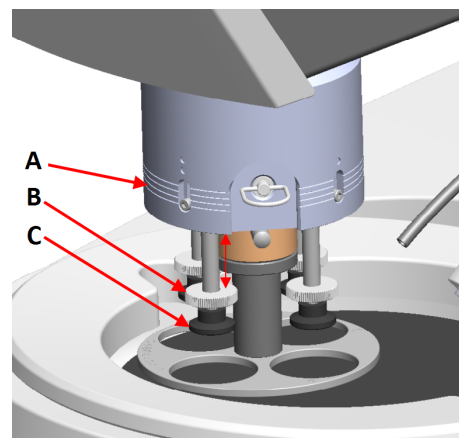
**7.2.6 Adjusting the force****Hint**

Do not use maximum force at the same time as maximum speed.

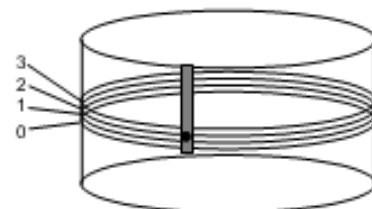
1. To adjust the force, turn the force adjustment screw.

The indications on the housing correspond to the actual force in Newton.

- A** Force indicator
B Force adjustment screw
C Pressure foot

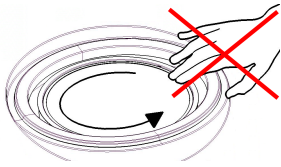


Indication	Force
(0)	0 - 5 N
1	10 N
2	20 N
3	30 N

**7.2.7 Manual preparation**

If you cannot prepare a specimen by using a standard specimen mover plate or specimen holder, you can prepare it manually.

When you perform manual preparation, you hold the specimen in your hand and press it firmly onto and across the preparation surface.



CAUTION

For manual preparation use the switch on the side of the specimen mover head to disable rotation of LaboForce-50.



CAUTION

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



CAUTION

When you perform manual grinding or polishing, be careful not to touch the disc.



CAUTION

Do not try to collect a specimen from the tray while the disc is rotating.

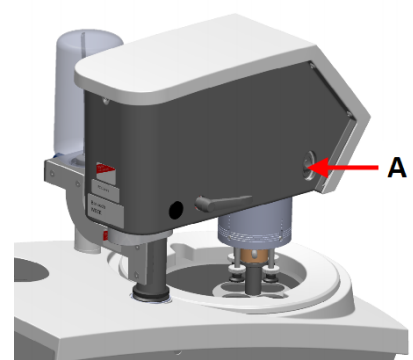


CAUTION

When the disc is rotating, make sure your hands are kept completely clear of its periphery and out of the splash bowl.

Rotation of the specimen mover head

- For manual preparation you can use the switch on the side of the specimen mover head to disable rotation of LaboForce-50.



A Switch

7.2.8 Starting and stopping the machine

Start the machine



WARNING

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

**CAUTION**

When working at machines with rotating parts, take care to prevent clothes and/or hair from being caught by the rotating parts.

**CAUTION**

Keep clear of rotating parts during operation.

**Note**

We recommend that an exhaust system is applied when alcohol-based suspension or lubricants are used.

1. Set the speed control to the desired disc speed.
2. Press the **Start** button. The machine starts operating.
3. If needed, adjust the disc speed.

**Stopping the machine**

- Press the **Stop** button.

**Emergency stop****Note**

Activating the emergency stop on the machine will stop all movable parts.

**Note**

Do not use the emergency stop for operational stop of the machine during normal operation.

1. Press the emergency stop button to activate an emergency stop.

**WARNING**

Before you release the emergency stop, investigate the reason for activating the emergency stop and take any necessary corrective action.

2. Turn the emergency stop button to release the emergency stop.

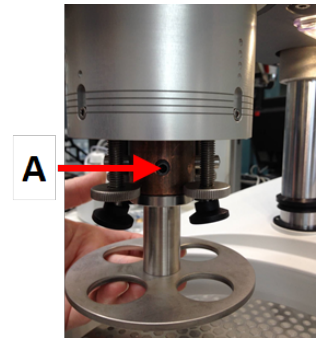
7.2.9 Removing the specimens

1. To release the specimens, pull the quick-release ring.
2. When you have removed the specimens, lower the spring housing back into position.

7.2.10 Changing the specimen mover plate

If you wish to prepare specimens of another diameter, use a different specimen mover plate. The specimens must fit the holes in the specimen mover plate.

1. Use the locking handle on the left side to unlock the specimen mover and let it move into upright position.
2. Pull the quick-release ring and lift the housing.
3. Loosen the screw and remove the specimen mover plate.
4. Insert a specimen mover plate and rotate it until the two pins are aligned with the holes in the specimen mover.
5. Push the specimen mover plate upwards and use the Allen key to tighten the screw to secure it in position.
6. Make sure that the specimen mover plate is securely mounted.
7. Make sure that the specimen mover plate is in a horizontal position.
8. If needed, adjust the position of the specimen mover plate. See [Adjusting the horizontal position of the specimen mover plate ▶ 30](#)
9. The specimen mover plate must be positioned to allow the specimen to run 3 – 4 mm over the edge of the preparation disc.
10. Lower the housing back into position.



A Screw

8 LaboDoser-10

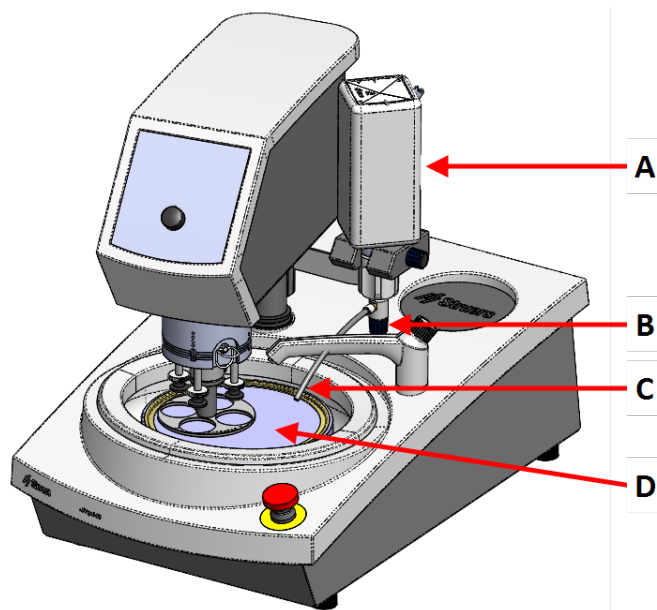
LaboDoser-10 is a drip lubricator for delivering an uninterrupted flow of suspension or lubricant on a preparation disc in the preparation (grinding or polishing) of materials for further materialographic inspection.

The device is designed to be used with Struers consumables specially designed for this purpose and this type of device.

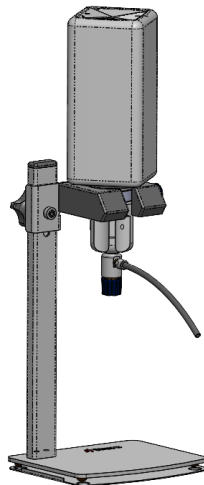
LaboDoser-10 can be mounted on:

- LaboUI
- LaboForce-50
- LaboForce-Mi

Alternatively, LaboDoser-10 can be placed on a LaboDoser-10 table stand.

LaboDoser-10 mounted on LaboPol

- A** LaboDoser-10 suspension/lubricant bottle
- B** Adjustable valve
- C** Dosing nozzle
- D** Preparation disc

LaboDoser-10 mounted on a LaboDoser-10 table stand

8.1 Unpack the machine

**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. Remove the loose parts.
3. Remove the unit from the box.

8.2 Check the packing list

The packing box contains the following items:

Pcs.	Description
1	LaboDoser-10 unit with 1 liter bottle
1	Allen key 3 mm
1	Bracket for doser arm
2	Hexagonal socket screws
1	Instruction Manual set

8.3 Installation

**Hint**

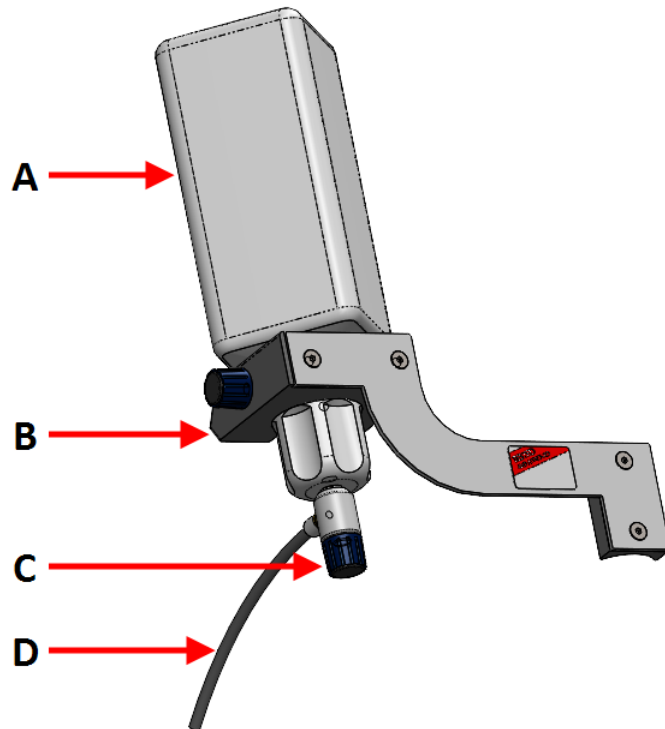
If lubricant or suspension is not to be used for a prolonged period of time, remove the bottle from the bottle holder and store it upright.

LaboDoser-10 can be mounted on the column of the following units:

- LaboUI
- LaboForce-50
- LaboForce-Mi

Procedure

- A** Suspension/lubricant bottle
- B** Doser arm
- C** Adjustable valve
- D** Dosing nozzle



1. Use the bracket and the two screws to mount the dosing arm on the column of the machine.
2. Attach the bottle cap with adjustable valve onto a Struers suspension/lubricant bottle.
3. Insert the bottle into the doser arm.

8.4 Operating LaboDoser-10

The operator adjusts a valve to deliver the required amount of suspension or lubricant on the preparation disc.

1. Place the dosing nozzle in the optimal position over the preparation disc.
2. Open the valve and adjust the suspension/lubricant dosing level.
3. When the preparation step has been completed, close the valve to stop dosing.

8.5 Changing lubricant/suspension

Struers recommends using a separate bottle cap for each consumable.

To use the bottle cap with another consumable:

1. Remove the bottle.
2. Hold the bottle firmly and remove the bottle cap.
3. Empty the bottle and fill it with a mild soap solution.
4. Open the valve and clean the dosing nozzle.
5. Exchange the soap water with clean water and repeat the above procedure.

- Put the bottle cap on a Struers lubricant/suspension bottle.

9 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 type plate of the machine.

9.1 General cleaning

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



Note

Do not use a dry cloth as the surfaces are not scratch resistant.



Note

Do not use acetone, benzol or similar solvents.

If the machine is not to be used for a longer period of time

- Clean the machine and all accessories thoroughly.

9.2 Daily

- Clean all accessible surfaces with a soft, damp cloth.
- Check the bowl liner and clean or dispose of it when it is filled with debris.

9.3 Weekly

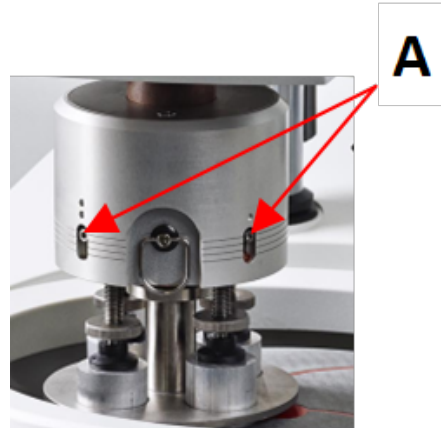
- Clean all accessible surfaces with a soft damp cloth and common household detergents.
- For heavy duty cleaning, use a heavy duty cleaning agent such as Solopol Classic.

9.4 Monthly

9.4.1 LaboForce-50 - pressure feet

The force on the pressure feet is generated by friction pins held in place by the screws in the spring housing.

- Use an Allen key to tighten the screws.



A Screws

9.5 Annually

9.5.1 Test the safety devices

The safety devices must be tested at least once a year.



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.



Note

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

9.5.2 Emergency stop

Test 1



1. Press the **Start** button. The machine starts operating.



2. Press the emergency stop.



3. If operation does not stop, press the **Stop** button.
4. Contact Struers Service.

Test 2



1. Press the emergency stop.



2. Press the **Start** button.



3. If the machine starts, press the **Stop** button.
4. Contact Struers Service.

9.6 Spare parts

Technical questions and spare parts

If you have technical questions or when you order spare parts, state the serial number. The serial number is stated on the type plate of the unit.

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).

**Note**

Replacement of safety critical components must only be performed by a Struers engineer or a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).

**Note**

Safety critical components must only be replaced by components with at least the same safety level.

9.7 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.

9.8 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.

10 Troubleshooting

10.1 Troubleshooting - LaboPol-20

Error	Cause	Action
Noise when the machine starts, or the turntable will not turn.	The belt is not tight enough.	The belt must be tightened. Contact Struers Service.
The machine does not operate when the start switch is pressed.	The main switch is off.	Turn the main switch on.
	The fuse is blown (located at the back of the machine).	Replace the fuse.
Water is not draining away.	Drain hose squeezed.	Straighten the hose.
	Drain hose clogged.	Clean the hose.
	Drain hose does not slope downwards.	Adjust the hose to an even slope.
Water dripping underneath the machine.	Leak in water hose or defect in solenoid valve.	Turn the main switch off. Disconnect the unit from the electrical power supply. Turn the water supply off. Disconnect the unit from the water supply, if needed. Contact Struers Service.
Cooling water stops	Water tap on water supply closed.	Turn the water on.
	Built-in water tap closed.	Turn the water on.
	Built in water tap blocked	Clean water tap.
	Filter at the water inlet blocked	Clean the filter with compressed air only.

10.2 LaboForce-50

Error	Cause	Action
The specimen mover head does not rotate.	Switch is set to "off".	If rotation is required, set the switch to "on".
Specimen holder plate vibrates.	Specimen holder plate screws loose.	Tighten specimen holder plate screws.
	Specimen holder plate unbalanced.	Replace specimen holder plate.

Error	Cause	Action
The preparation disc runs unevenly or stops.	Force too high.	Reduce the force.
The preparation disc stops.	Frequency inverter has stopped the equipment.	Switch the equipment off. Wait for a few minutes then restart. If the error remains: Contact Struers Service.
The specimen mover starts to turn.	Column screws loose.	Tighten the screws immediately.
Bad or unusual preparation results from the same method.	Pressure foot turns by itself, leading to differing forces.	Increase friction by tightening the screws in the housing. See the section "Maintenance".
Uneven specimens.	Specimens are passing over the center of the disc.	Reposition the horizontal position of the control panel.

11 Technical data

11.1 Technical data

Preparation discs	Diameter	200 mm (8")
	Rotational speed	50-500 rpm, variable
	Spin	600 rpm
	Rotational direction	Counter-clockwise
	Motor power, continuous, S1	370 W (0.5 hp)
	Torque (at 300 rpm)	>12 Nm(Newton meter)
Safety standards		See the Declaration of Conformity
Operating environment	Surrounding temperature	5 - 40°C (41 - 104°F)
	Humidity	< 85% RH non-condensing
Storage and transport conditions	Surrounding temperature	-20 - 60°C (-4 - 140°F)

Power supply	Voltage/frequency	200-240 V/50-60 Hz
	Power inlet	1-phase (N+L1+PE) or 2-phase (L1+L2+PE) The electrical installation must comply with Installation Category II
	Power, nominal load	600 W
	Power, idle	11 W
	Current, nominal load	2.7 A
	Current, maximum load	6.3 A
	Current, largest load	2.6 A
	Safety Circuit Categories/Performance Level	Emergency stop
Residual Current Circuit Breaker (RCCB)		Type A, 30 mA (or better) is recommended
Water supply	Pressure, tap water	1-9.9 bar (14.5-143 psi)
	Water inlet	Diameter: ½" or ¾"
	Water outlet	Diameter: 32 mm (1¼")
Noise level	A-weighted sound emission pressure level at workstations	LpA = 63 dB(A) (measured value). 4 dB
Vibration level	Declared vibration emission	Total vibration exposure to upper parts of the body does not exceed 2.5 m/s ² .
Dimensions and weight	Width	40 cm (15.7")
	Depth	67.3 cm (26.5")
	Height	28 cm (8.7")
	Weight	22 kg (49 lbs)

11.2 Safety Circuit Categories/Performance Level

Safety Circuit Categories/Performance Level	Emergency stop	PL c, Category 1 Stop category 0
--	----------------	-------------------------------------

11.3 Noise and vibration levels

Noise level	A-weighted sound emission pressure level at workstations	$L_{pA} = 63 \text{ dB(A)}$ (measured value) Uncertainty $K = 4 \text{ dB}$ Measurements made in accordance with EN ISO 11202
Vibration level	During preparation	Total vibration exposure to upper parts of the body does not exceed 2.5 m/s^2 .

11.4 Technical data - equipment units

For technical data covering the individual units of equipment, see the specific equipment manual.

11.5 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.

Safety related part	Manufacturer/Manufacturer description	Manufacturer catalog no.	Electrical ref.	Struers catalog no.
Emergency stop button	Schlegel Latching mushroom head	ES Ø22 type RV	S1	2SA10400
Emergency stop contact	Schlegel Modular contact, momentary	1 NC type MTO	S1	2SB10071
Module holder	Schlegel Module holder. 3 elem. MHR-3	MHR-3	S1	2SA41603

Safety related part	Manufacturer/Manufacturer description	Manufacturer catalog no.	Electrical ref.	Struers catalog no.
Frequency inverter	Lenze	i550-C0.37/230-1, Standard I/O, STO	A2	2PU51037
Relay	Schneider Electric Relay 24 V DC DPDT	RPM21BD	K1	2KL02124
Water valve	ODE	21A2KV20, BDV08024CY	Y1	2YM12120

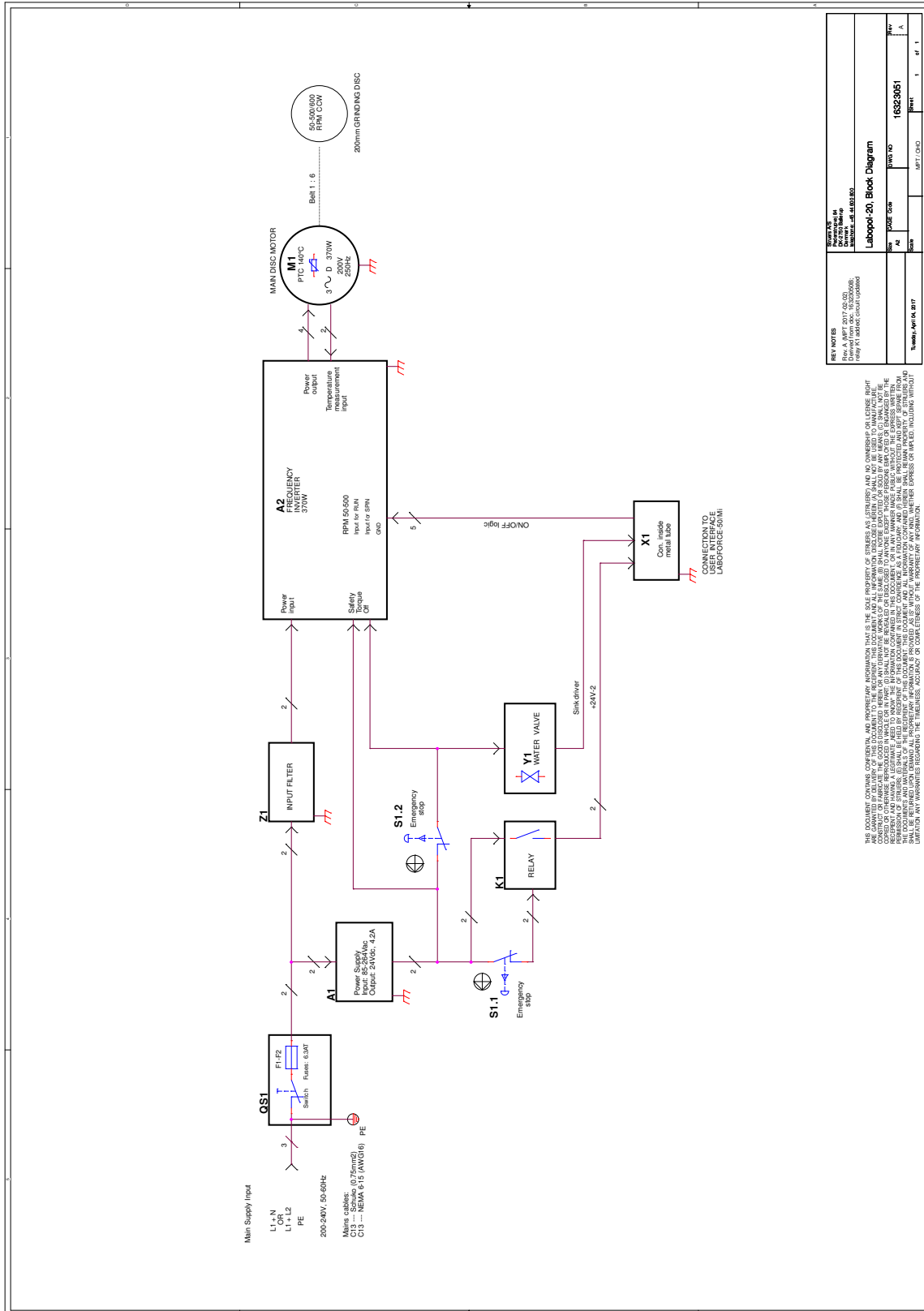
11.6 Diagrams

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

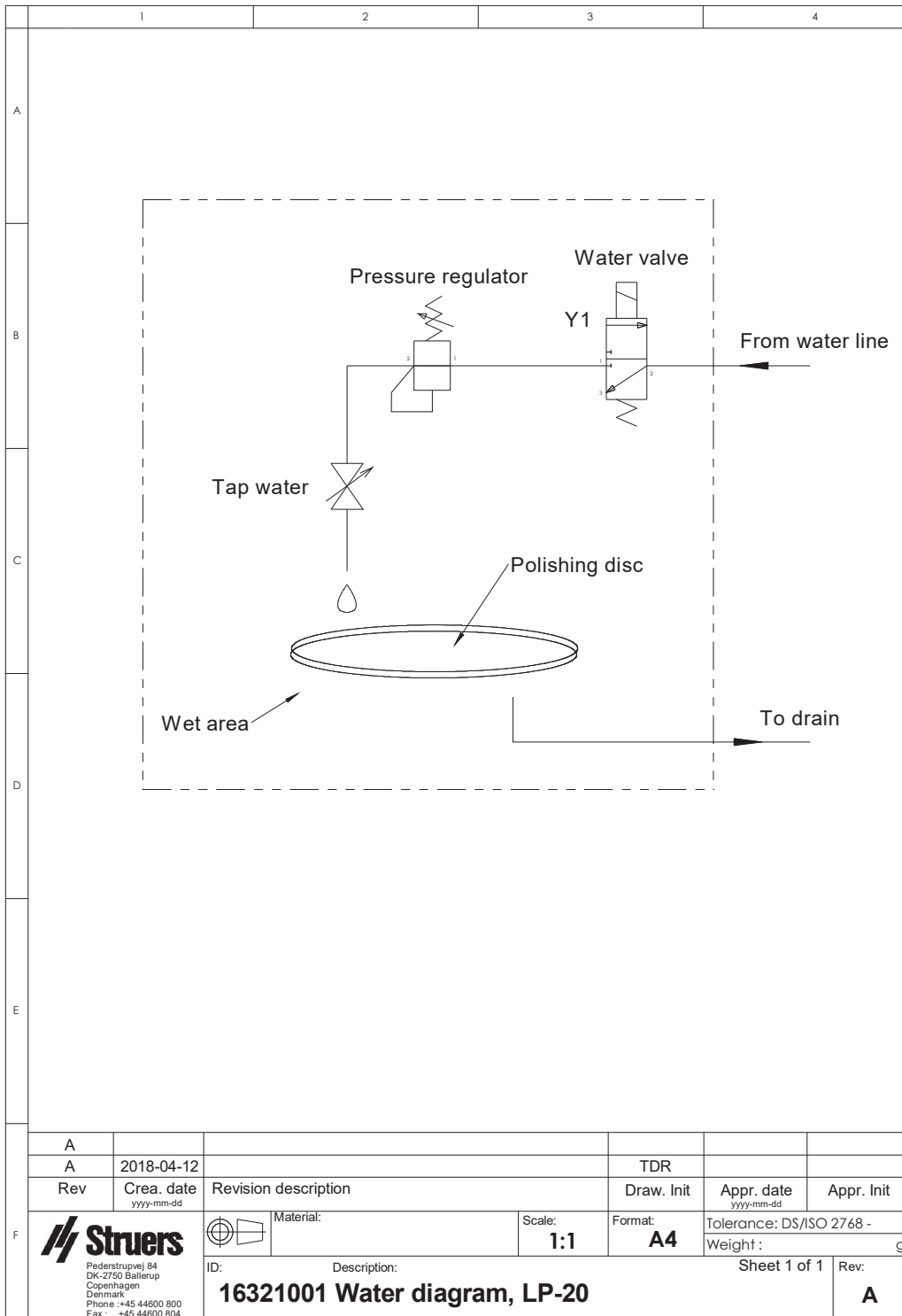
11.6.1 Diagrams - LaboPol-20

Title	No.
LaboPol-20, Block diagram	16323051 A
LaboPol-20, Water diagram	16321001 A

16323051 A



16321001 A



A					
A	2018-04-12		TDR		
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
F	Struers Pederstrupvej 84 DK-2750 Ballerup Copenhagen Denmark Phone : +45 44600 800 Fax : +45 44600 804	Material:	Scale: 1:1	Format: A4	Tolerance: DS/ISO 2768 - Weight : g
ID:		Description: 16321001 Water diagram, LP-20		Sheet 1 of 1	Rev: A

11.6.2 Diagrams - equipment units

For diagrams covering the individual units of equipment, see the specific equipment manual.

11.7 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.

12 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	LaboPol-20
Model	N/A
Function	Grinding/Polishing machine
Type	632
Cat. no.	06326127 In combination with: 06206901 (LaboUI), 06356127 (LaboForce-50)
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 14120:2015, 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 61000-6-1:2007, EN 61000-6-3:2007, EN 61000-6-3:2007/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