

Minitom

Instruction Manual



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Revision A

Date of Release 2018.12.20

Original instructions

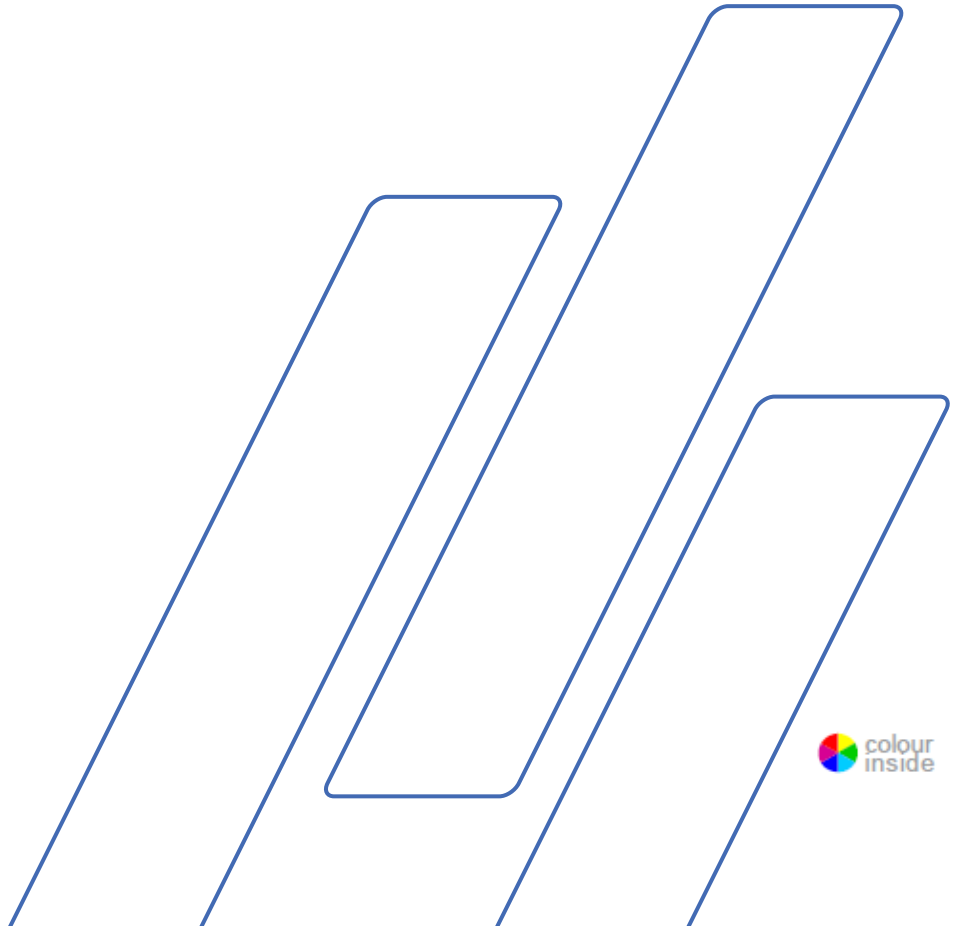


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Intended use

For professional automatic metallographic cutting of materials, primary non-metals, for further metallographic inspection and only to be operated by skilled/trained personnel. The machine is only designed to be used with Struers consumables specially designed for this purpose and this type of machine.

Do not use the machine for:

Cutting of materials other than solid materials suitable for metallographic studies. In particular, 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.

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

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

Models:

Minitom

**NOTE:**

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

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

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

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

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

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Minitom Safety Precaution Sheet

Read carefully before use

1. Ignoring this information and mishandling of the equipment can lead to severe bodily injuries and material damage.
2. The machine must be installed in compliance with local safety regulations. All functions on the machine and any connected equipment must be in working order.
3. The operator(s) must read the Safety and User's Guide sections of this manual and the relevant sections of the manuals for any connected equipment and accessories. The operator(s) must read the Instructions for Use and, where applicable, Safety Data Sheets for the applied consumables.
4. This machine is to be operated and maintained by skilled/trained personnel only.
5. Use only intact cut-off wheels.
6. Keep hands away from cut-off wheel during cutting.
7. The machine must be placed on a safe and stable table with an adequate working height and which is able to carry the machine and supplementary accessories and consumables.
8. Operators should ensure that the actual voltage corresponds to the voltage on the rear of the machine. The machine must be earthed. Follow the local regulations. Always turn the power off and remove the plug or the cable before opening the machine or installing additional components.
9. Consumables: only use consumables specifically developed for use with this type of materialographic machine.
10. Observe the current safety regulations for handling, mixing, filling, emptying and disposal of the additive for cooling fluid.
11. Avoid skin contact with the additive for cooling fluid.
12. Do not start the machine until the splash guard is mounted.
13. Do not remove the splash guard until the cut-off wheel has stopped completely.
14. The specimen must be securely clamped in a clamping device.
15. Use of working gloves is recommended as workpieces may be both very hot and produce sharp edges.

Minitom
Instruction Manual

- 16.** When working with machines with rotating parts, take care that clothing and/or hair cannot be caught by the rotating parts. Appropriate safety clothing must be used.
- 17.** If you observe malfunctions or hear unusual noises - stop the machine and call technical service.
- 18.** The machine must be disconnected from the mains prior to any service. Wait 5 minutes until residual potential on the capacitors is discharged.
- 19.** Do not cycle mains power more than once every 3 minutes. Damage to the drive will result.
- 20.** In case of fire, alert bystanders, the fire brigade and cut power. Use a powder fire extinguisher. Do not use water.

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

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

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

Icons and typography

Struers uses the below icons and typographical conventions. For a list of the Safety Messages used in this manual, see the section on [Cautionary Statements](#).

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

Icons and Safety Messages



ELECTRICAL HAZARD

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



DANGER

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



WARNING

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



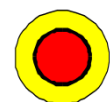
CAUTION

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



CRUSHING HAZARD

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



EMERGENCY STOP

General Messages



NOTE

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



HINT

indicates additional information and tips.

Colour Inside Logo



The 'colour inside' logo on the cover page of this Instruction Manual indicates that it contains colours which are considered to be useful for the correct understanding of its contents.

Users should therefore print this document using a colour printer.

Typographic conventions

Bold type	indicates button labels or menu options in software programs
<i>Italic type</i>	indicates product names, items in software programs or figure titles
<u>Blue text</u>	indicates a link to another section or webpage
■ Bullets	indicates a necessary work step

User's Guide

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1. Getting Started

Device Description

Minitom is an automatic cut-off machine, with integrated cooling tank, for cutting the majority of solid and stable (non-explosive) materials, primary non-metals. The cut-off wheel speed and cutting pressure can be adjusted during the cutting process.

The cutting process starts by the operator selecting and mounting the cut-off wheel to be used and cut-off wheel rotation speed. The specimen is secured by using the clamping tool mounted on the specimen holder arm. Stop position is adjusted by moving the stop plate.

A micrometre screw is used to move the specimen horizontally in relation to the cut-off wheel.

The operator starts the machine manually.

Hereafter, the specimen mover arm is moved slowly down towards the cut-off wheel and the cutting pressure is adjusted using the weight on the specimen holder arm.

The machine stops automatically, and the operator can remove the cut-off specimen.

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

Unpacking Minitom

- Carefully, cut the packing tape on top of the box.
- Remove the loose parts.
- Carefully lift Minitom from the box, supporting from underneath the machine.

Checking the Contents of Packing

In the packing box you should find the following parts:

- 1 Minitom (precision cut-off machine)
- 1 Arm with universal specimen holder
- 1 Splash Guard
- 1 Grid plate for collecting the specimen
- 1 Coolant tank with grid plate
- 1 Set of flanges, 42 mm dia.
- 1 Set of flanges, 65 mm dia.
- 2 M5x40 mm screws for large specimens
- 1 Allen key, 2.5 mm
- 2 Allen key, 4 mm
- 2 Mains cables
- 1 Instruction Manual set



NOTE

Store the packing box and foam packaging for future use. Failure to use the original packaging and fittings could cause severe damage to the machine and will void the warranty.

Placing Minitom

- Place Minitom on a safe and stable support table or work bench.
 - Check that the machine rests securely with all 4 rubber feet on the table.
 - The table should have an adequate working height. Recommended height 80-90cm.
- Place Minitom close to connections for mains power.

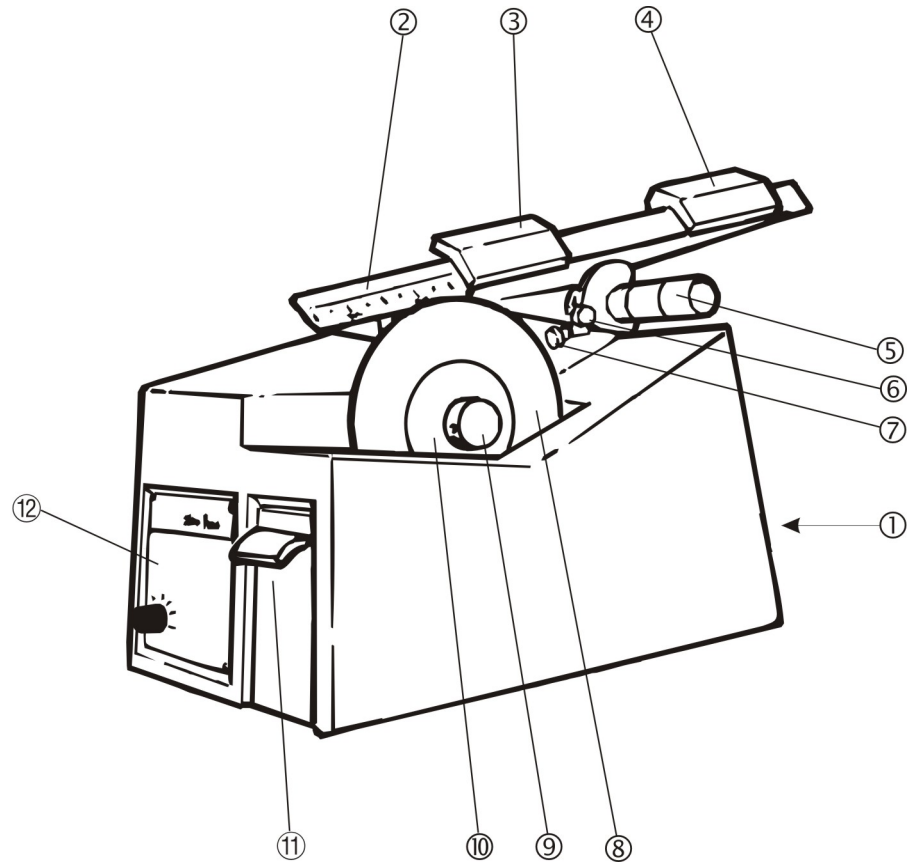


NOTE

Ensure that the work station has adequate, ambient lighting (300 lumen). Avoid direct glare (dazzling light sources within the operator's line of vision) and reflected glare (reflections of light sources).

**Getting Acquainted with
Minitom**

Take a moment to familiarise yourself with the location and names of all the Minitom components:



- | | |
|-------------------------|-----------------------------|
| ① Main switch (at rear) | ⑦ Lock for micrometer screw |
| ② Specimen holder arm | ⑧ Cut-off wheel |
| ③ Front weight | ⑨ Chamfered nut |
| ④ Rear weight | ⑩ Flange |
| ⑤ Micrometer screw | ⑪ Shutter for cooling tank |
| ⑥ Adjustable stop plate | ⑫ Control panel |

Supplying Power



ELECTRICAL HAZARD

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



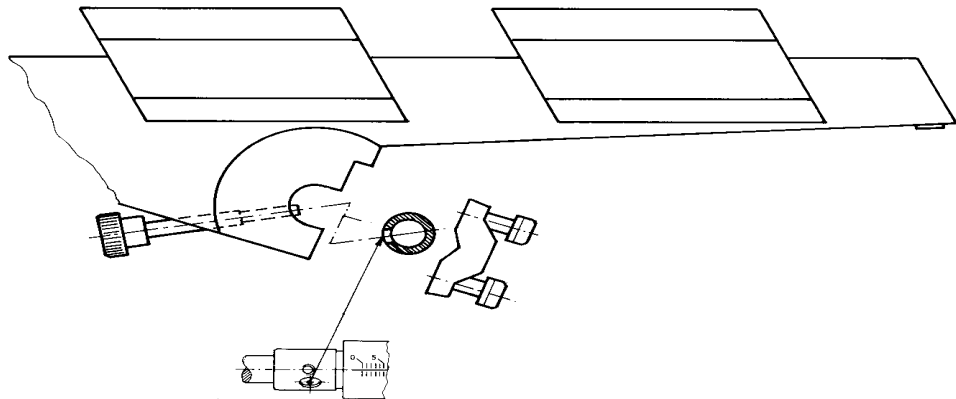
NOTE

Check that the mains voltage corresponds to the voltage stated on the type plate on the back of the machine.

- Mount a plug on the electric cable and connect it as follows:
Yellow/green: earth
Blue: neutral
Black/Brown: phase

Mounting the Specimen Holder Arm

- Unscrew the fitting on the back of the arm with the 4 mm Allen key and place the arm on the micrometer screw.
- Screw the fitting loosely on.
- Push the arm against the shoulder of the micrometer screw.
- Keep the arm in horizontal position. The hole in the micrometer screw and the locking screw must be aligned.
- Tighten the fitting.



Filling the Recirculation Cooling Unit with Water

- Pull out the shutter for coolant tank.
- Fill the cooling tank with 235 ml of water and 15 ml Struers Additive (Corrozip).



Open the shutter.



Remove the tank for cleaning and refilling.

- Close the shutter.

2. Basic Operation

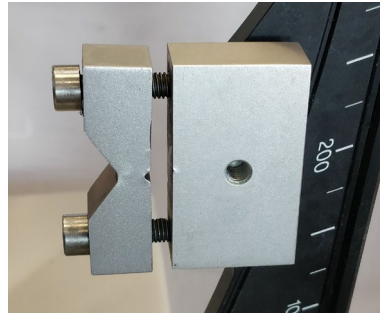
Control Panel



	Key	Function		Function
START		Starts the machine. While the motor is running the light diode lights green.	Power	Lights when the Main Switch has been turned to ON.
STOP		Stops the machine.	OVERLOAD INDICATOR	Red warning lamp indicating overload of motor. When the warning lamp lights the machine cannot be started.
CUTTING SPEED		Adjustable knob for setting the required speed for the cut-off wheel.		

Clamping the Specimen

- Fasten the specimen in the specimen holder using the 4 mm Allen key. It must be fastened tightly to avoid vibrations during cutting.
- For a round specimen, flip the specimen holder allowing the large notch to secure it.



NOTE

For large specimens, replace the short screws (35mm) with the 40mm screws.

Mounting the Cut-off Wheel

- Test the cut-off wheel, to check for cracks or other damage, before mounting. See [Testing Cut-off Wheels](#) on page 20.
- Remove the grid plate.
- Unscrew the chamfered nut.
- Remove the cut-off wheel and the flanges.
- Mount the new cut-off wheel between two flanges.
- Screw on the chamfered nut and fasten it gently.
- Put the grid plate into place.

Changing the Specimen Holder

- Unscrew the specimen holder using a 4 mm Allen key and remove.
- Fix the new specimen holder to the specimen holder arm by means of a screw. Fasten securely with a 4 mm Allen key.



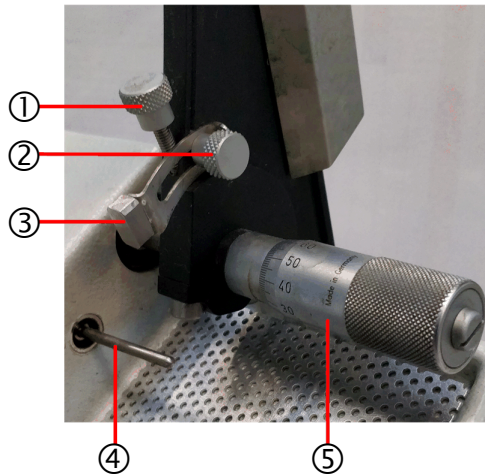
NOTE

Check that the cut-off wheel can cut through the specimen without the flanges meeting the specimen holder. The specimen must protrude at least 6 mm / 0.3" from the specimen holder.

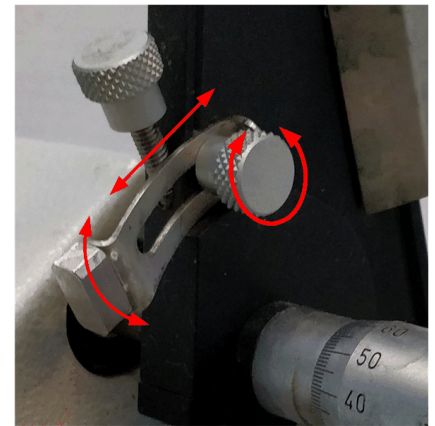
Mechanical Settings

Stop Position

Minitom stops when the stop plate comes into contact with the stop pin. Adjust the stop plate so that Minitom stops when the specimen has been cut through.



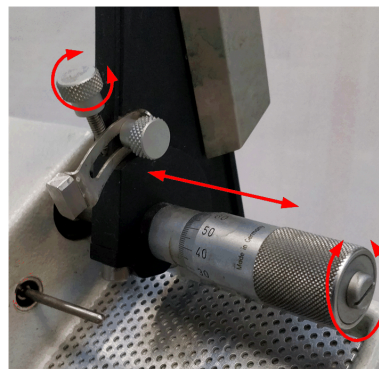
- ① Locking screw – micrometer
- ② Locking screw – stop plate
- ③ Stop plate
- ④ Stop pin
- ⑤ Micrometer screw



- Adjust the stop plate position:
- Loosen the locking screw.
 - Move the stop plate until it rests on the stop pin.
 - Tighten the locking screw.

Specimen Holder Position


- Loosen the micrometer locking screw.
- Adjust the position of the cut by turning the micrometer screw.
- After adjustment, tighten the locking screw.



Cutting Pressure

- Push the weights of the specimen holder arm back.
- Adjust the rear weight so that the arm with specimen holder and specimen are in balance.
- Adjust the cutting pressure with the front weight.
- Tilt the arm carefully back to a vertical position.

Starting the Cutting Process

- Mount the splash guard.
- Set cutting speed to the lowest speed.
- Press START .
- Move the specimen holder arm slowly down towards the cut-off wheel.
- Adjust the speed of the cut-off wheel (for 127 mm / 5" cut-off wheels the speed should not exceed 300 rpm).



CAUTION

The cut-off wheel is not covered.
Keep hands away from cut-off wheel during cutting.
Take care that clothing and/or hair cannot be caught by the rotating parts.



NOTE

Reduce the wheel speed if the specimen moves up and down or the cut-off wheel vibrates when cutting.

NOTE

Do not open the shutter for the cooling tank during operation.

Stopping the Cutting Process

The machine can be stopped at any time during the cutting process.

- Press STOP .



NOTE

The cut-off wheel may stop rotating if the cutting speed is set to the lowest level.

This should not be used to stop the cutting process.

3. Maintenance

Proper maintenance is required to achieve the maximum uptime and operating lifetime of the machine. Maintenance is also important in ensuring your machine's continued safe operation. The maintenance procedures described in this section must be carried out by skilled or instructed persons.

General Cleaning

To ensure a longer lifetime for your Minitom, Struers strongly recommends daily cleaning of the cutting chamber. Clean the cutting chamber thoroughly if the Minitom is not to be used for a longer period of time.

Daily Service

The micrometer screw is a precision tool which should be cleaned daily.

- Clean any cutting waste from the micrometer screw.
- Coat with a thin layer of universal household oil.



NOTE:

Do not use a dry cloth as the surfaces are not scratch resistant. Grease and oil can be removed with ethanol or isopropanol.

NOTE:

Never use acetone, benzol or similar solvents.

Weekly Service

- Clean all accessible surfaces with a soft, damp cloth.
- Lubricate the spindle/bushing where the cut-off wheel is mounted with universal household oil.

Monthly Service

- Clean and lubricate the specimen holder screws. Use universal household oil.
- Lubricate the shutter/platform with universal household oil and adjust when necessary

If the weights slide too easily or too tightly on the arm:

- Adjust the movement using the screws on the left side of the weights.

Cut-off Wheels

- Store the cut-off wheel dry in a horizontal position on a plane surface, preferably under light pressure.

A clean and dry cut-off wheel does not corrode.

- Clean and dry the cut-off wheel before it is put away. Use ordinary household detergents.

Dressing Cut-off Wheels

A newly dressed cut-off wheel will give an optimum cut. A badly maintained and dressed cut-off wheel demands a higher cutting pressure which will result in more frictional heat. The wheel may also bend and cause a wry cut. A combination of both factors may result in damage to the cut-off wheel.

Cut-off wheels should be dressed as follows:

- Check that there is enough coolant in the coolant tank.
- Clamp the dressing stick in the specimen holder (use the double parallel vice if available as this will hold the dressing stick more securely).
- Let the cut-off wheel rotate on minimum speed and cut the dressing stick the normal way.



NOTE

Never dress the cut-off wheel manually as a slight twisting of the dressing stick may very easily damage the thin cut-off wheels.

Testing Cut-off Wheels

Cut-off wheels must be inspected before use.

To test a Diamond/CBN cut-off wheel, perform a ring test:

- Suspend the cut-off wheel using an index finger or a pencil.
- With a pencil (not metal), gently tap the cut-off wheel around the edge.
 - The wheel passes the test if it gives a clear metallic tone when tapped.
 - The wheel fails the test if the sound is dull or muted. This indicates that the cut-off wheel is cracked and must not be used.

4. Cautionary Statements



ELECTRICAL HAZARD

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



CAUTION

The cut-off wheel is not covered.
Keep hands away from cut-off wheel during cutting.
Take care that clothing and/or hair cannot be caught by the rotating parts.

5. Transport and Storage



NOTE:

Store the packing box and foam packaging for future use. Failure to use the original packaging and fittings could cause damage and will void the warranty.

Follow these steps:

- Disconnect the power supply and empty the cooling tank.
- The specimen holder arm must be in its upright position during transport.
- Move it to its new position.

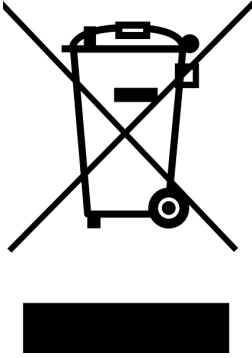
If the machine is bound for long-time storage or shipping, follow these steps:


- Disassemble the machine, clean and dry it thoroughly.
- Place the machine in a plastic bag with bags of desiccant (silica gel) and seal it tight.
- Wrap the specimen holder arm in bubble wrap.
- Place all loose parts in a zip bag.
- Secure the machine in the cardboard box using the foam packaging.
- Place the accessories and other loose items in the box.
- Close the box.

At the new location, check that:

- The facilities required are in place.

6. Disposal



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

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

NOTE:

Swarf must be disposed of according to the current safety regulations for handling and disposal of swarf/ additive for cooling fluid.

NOTE:

The cooling fluid will contain additive and cutting swarf and may **NOT** be disposed of into a main drain. Cooling fluid must be disposed of in compliance with local safety regulations.

Reference Guide

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1. Struers Knowledge

Materialographic cutting is where most microstructure analysis begins.

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

Minimizing cutting artefacts 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.

2. Consumables and Accessories

Consumables

The use of Struers consumables is recommended.
Other products (e.g. coolants) may contain aggressive solvents, which dissolve e.g. rubber seals. The warranty may not cover damaged machine parts (e.g. seals), where the damage can be directly related to the use of non-Struers consumables.

Cut-off Wheels

Please refer to the Selection Guide in the [Struers Cut-off Wheels brochure](#) or [Struers Consumables Catalogue](#).

Other consumables

Specification	Cat. No:
<i>Corrozip</i> Additive for Cooling Fluid. To protect the machine from corrosion and to improve cutting and cooling qualities. For Recirculation Cooling Unit.	
1 l	449900045
5 l	449900046

Accessories

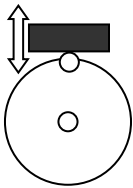
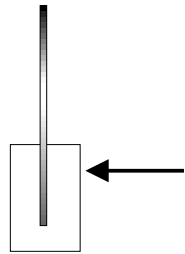
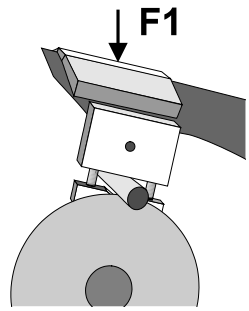
Specification	Cat. No:
Specimen Holders	
<i>for general use. Vice type</i> with max. opening 25 mm / 1".	04436901
<i>with double parallel vice</i> suited for long specimens	04436902
for irregular specimens, with 5 screws	04436904
<i>for round specimens</i> Max. opening 30 mm/1.1/2"	04436903
<i>for adhering specimens</i>	04436905
<i>for round or square specimens</i> Tear-drop type with max. opening 20 mm/0.8"	04436906



HINT

Struers offers a comprehensive range of consumables for grinding and polishing. Please ask for separate leaflets.

3. Trouble-Shooting

Error	Cause	Action
Vibrations.	The diamond layer is worn down to the level of the metal disc.	Replace with a new cut-off wheel.
The specimen moves radically up and down when cutting. 	The cut-off wheel is worn and therefore less round.	Reduce the speed until cutting is steady – failing this the cut-off wheel might be destroyed.
	The specimen forces the cut-off wheel to the side when cutting. Heavy friction causes vibrations.	Reduce the cutting force.
	The cutting arm is not balanced.	Balance the cutting arm better and use a sufficient force on F1.
	The cut-off wheel needs dressing.	Dress the cut-off wheel.
	Incorrect cut-off wheel.	Select another wheel. Please refer to the Selection Guide in the Struers Cut-off Wheels brochure or Struers Consumables Catalogue .

4. Service

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

Struers offers 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.



NOTE:

Servicing may only be performed by a Struers engineer or a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).

Contact Struers Service for information.

5. Spare Parts and Diagrams

Spare parts

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

Safety Related Parts

Spare Part	Cat no:
Grid plate for collecting the specimens	14430016
Splash guard	14430018

**NOTE:**

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

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

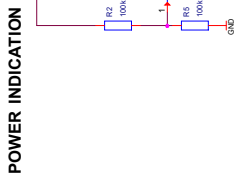
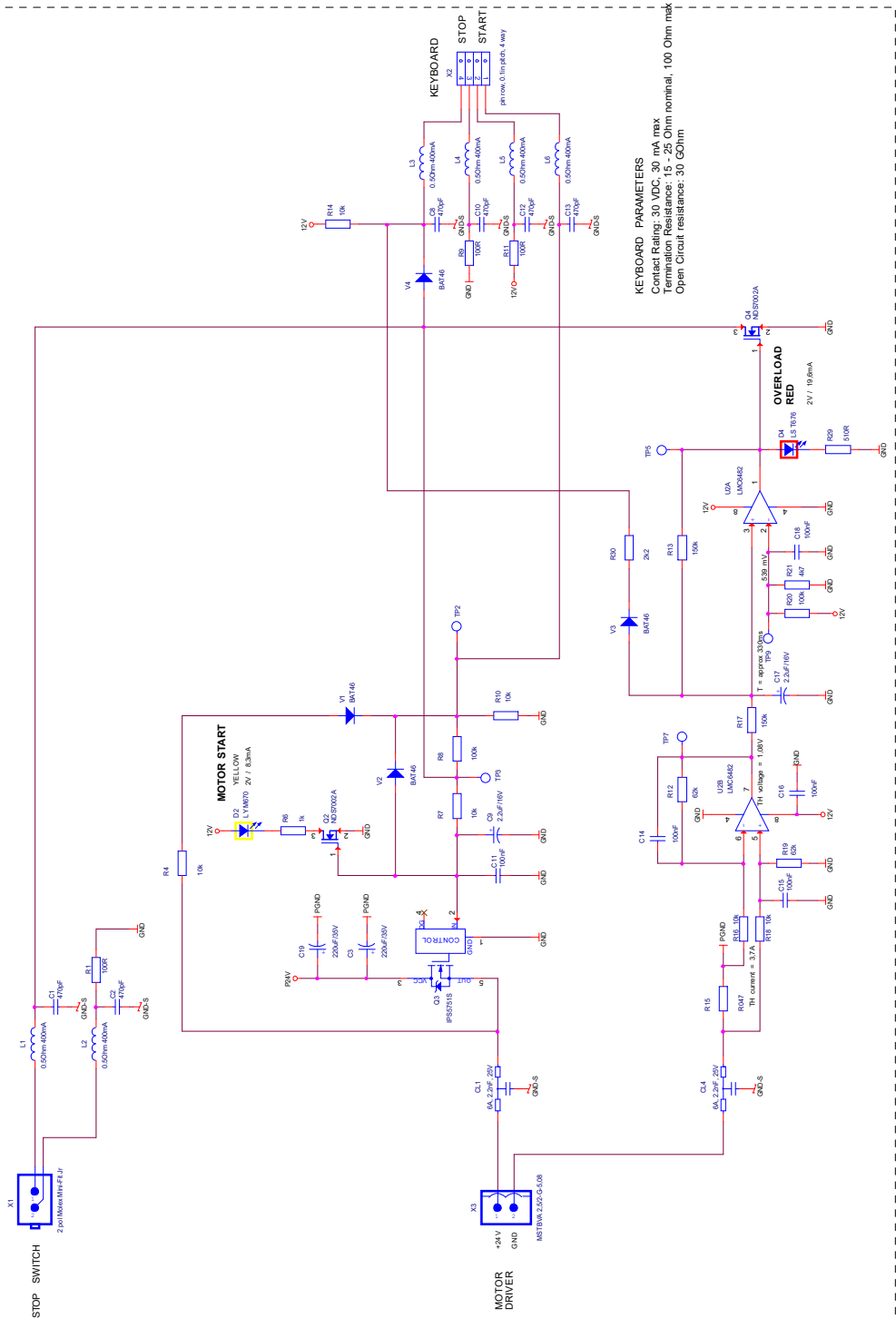
Contact Struers Service for information.

Diagrams

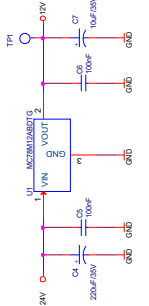
Minitom Circuit Diagram	14433110
PCP Circuit Diagram	14433200

See the following pages.

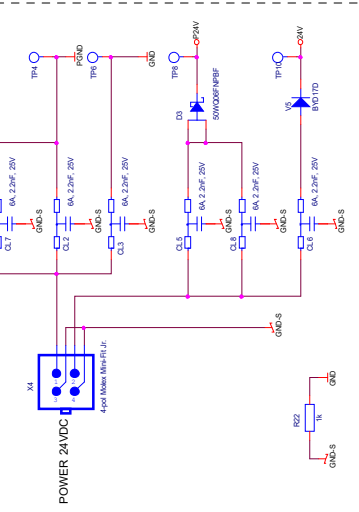
CONTROLLING OF MOTOR, OVERLOAD, KEYBOARD



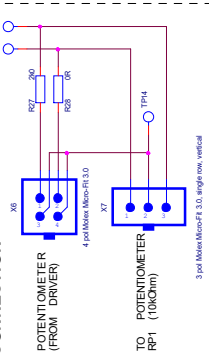
12V POWER SUPPLY



MAIN POWER



POTENTIOMETER CONNECTION



PCB No. 1006027.1

REV.B: CH (2006/06/30)
 changed name of this drawing
 REV.C: CH (2007/02/25)
 - Changed value of R1
 - Changed value of R11

STRLEN: A3	DATE Code	DWG NO	Rev
DIAGNO: 0000000000	<Code>	14433200	I C
PCB No. 1006027.1	Scale	Sheet	1
Thursday, March 01, 2007	CH		

MINITOM, PCB DIAGRAM

6. Legal and Regulatory

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this product not expressly approved by Struers ApS could cause harmful radio interference and void the user's authority to operate the equipment.

7. Technical Data

Subject		Specifications
Cutting	Motor	38 W
	Power – constant	0.075 A
	Power – intermittent	0.125 A
	Power _{rmax}	0.2 A
	Current spikes	0.073 A
	Cut-off wheels	100-127 mm (4"-5") dia.
	Output axle	Rotational speed: 100-420 rpm Diameter: 12.7 mm (2" Cut-off wheel diameter: 100-127 mm (4"-5"))
Arm	Balancing specimen holder with specimen: up to 200g Cutting pressure: 0-350 g Axial movement: 0-25 mm	
	Cooling tank	Volume: 250 ml
Noise level¹	L _{pA} = 58 dB(A) (measured value) Uncertainty K = 4 dB Measurements made in accordance with EN ISO 11202	
Supply	Voltage / frequency: 100-240 V, 50-60 Hz	
Dimensions Including action radius of the arm	Width: 280 mm Depth: 400 mm Height: 400 mm Weight: 8 kg	
EU Directives	Please refer to the Declaration of Conformity	
Operating environment	Surrounding temperature	5 – 40°C / 41 – 104°F (operation) 0 – 60°C / 32 – 140°F (storage)
	Humidity	< 95% RH non-condensing (operating) < 90% RH non-condensing (storage)

¹ The figures quoted are emission levels and are not necessarily safe working levels. While there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of the workforce include characteristics of the work room, the other sources of noise, etc., i.e. the number of machines and other adjacent processes. Also, the permissible exposure level can vary from country to country. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk.

Contents of the Declaration of Conformity

Manufacturer

Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark
Telephone +45 44 600 800

Herewith declares that

<i>Name:</i>	Minitom
<i>Function:</i>	Precision cut-off machine
<i>Type:</i>	04436216

fulfils all the relevant provisions of the:

**Machinery Directive
2006/42/EC**

according to the following standard(s):
EN ISO 12100:2010, EN 60204-1:2006/A1-2009/Cor.:2010AC:2010.

and is in conformity with the:

**EMC Directive
2014/30/EU**

according to the following standard(s):
EN 61000-3-2:2014, EN 61000-3-3:2013, EN 61000-6-1:2007, EN 61000-6-2-Cor.:2005, EN 61000-6-3:2007/A1:2011/A1-AC:2012.

**RoHS Directive
2011/65/EU**

according to the following standard(s):
EN 50581:2012.

Supplementary Information

The equipment complies with the following standards:
NFPA 79:2018, FCC 47 CFR part 15, subpart B.

The above has been declared according to the global approach, module A.

Authorized to compile the Technical File:

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