

Magnutom-400/ Magnutom-500

Instruction Manual



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Intended use

For automatic cutting of metallic or other solid materials for further material inspection and only to be operated by skilled/trained personnel. The machine is only designed to be used with abrasive cut-off wheels 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 materialographic studies. In particular, the machine must not be used for cutting 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 cutting wheels which are not compatible with the machine requirements (e.g. saw-blade or toothed cutting wheels).

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

Models:

Magnutom-400
Magnutom-500



NOTE:

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

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

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

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

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Magnutom 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.
3. The machine must be placed on a stable floor which is able to carry at least 3000 kgs / 6600 lbs (Magnutom, Coolimat and specimens). The machine must be levelled by means of the adjustable legs provided.
4. When lifting the machine by the built-in truck lifting point, ensure that the boom is properly secured with the locking pins provided.
5. Before transport, secure the drive shaft with the locking system provided.
6. 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.
7. All safety functions of the machine must be intact and in working order. The machine must be installed in compliance with local safety, regulations.
8. Use only intact cut-off wheels. The cut-off wheels must be approved for a spindle speed of min. 1950 rpm / 42 m/s (Magnutom-400), 1850 rpm / 50 m/s (Magnutom-500).
9. The machine is not for use with saw-blade type cut-off wheels.
10. Do not use the machine for cutting materials that are flammable or unstable during the cutting process (e.g. combustible or explosive materials).
Do not use the machine for cutting materials that are not suitable for materialographic cutting.
11. Observe the current safety regulations for handling, mixing, filling, emptying and disposal of the additive for cooling fluid.
12. The workpiece must be securely fixed in the a quick-clamping device or similar. Large or sharp workpieces must be handled in a safe way.
13. Use of safety goggles and gloves are recommended when using the flushing hose.
14. Do not work on or around cutting table whilst it is being repositioned.

- 15.** For maximum safety and lifetime of the machine, use only original Struers consumables.
- 16.** Never look directly into the laser beam. (Laser straight edge option).
- 17.** Struers recommend the use of an exhaust system as the cutting materials may emit harmful gasses or dust
- 18.** The machine emits only moderate noise. However, the cutting process itself may emit noise, depending on the nature of the workpiece Use hearing protection if exposure to noise exceeds levels set by local regulations.
- 19.** When a recirculation cooling unit is used, observe the current safety regulations for handling, mixing, filling, emptying and disposal of the additive for cooling fluid.
Do not use flammable cooling fluid.
Use of gloves and goggles are recommended.
Do not use cooling liquid other than water and Struers additives for cooling fluid.
- 20.** In case of fire, alert bystanders, the fire brigade and cut power. Use a powder fire extinguisher. Do not use water.
- 21.** The machine must be disconnected from the mains prior to any service.
- 22.** Ensure that the cut-off wheel is secured before working on or around the cutting table.
- 23.** Only use the flushing gun for cleaning *inside* the cutting chamber.
- 24.** If any unusual noise is heard during operation, refrain from further use of the machine, and contact a Struers Service Technician.

The equipment should only be used for its intended use 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 maintenance, service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.).

Icons and typography

Struers uses the following icons and typographical conventions. 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
■ Bullets	indicates a necessary work step

User's Guide

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1. Getting Started

Device Description

Magnutom-400/-500 is an automatic cut-off machine, designed for cutting of large and over-sized workpieces. The machine is designed for wet abrasive cutting of all stable and non-explosive metals. It is equipped with a recirculation system for cooling liquid.

The cutting process starts by securing the workpiece to the cutting table with clamping tools. The operator selects the cutting parameters and consumables (e.g. cut-off wheel).

The operator closes the safety guard, which locks when the operator starts the machine. It remains locked for the duration of the cutting. When the cut-off wheel stops, the lock releases and the workpiece and the specimen can be removed.

In case of a power loss during a cutting process, use the special key to open the power-to-open safety guard. Finally, the category B emergency stop cuts the power to the cut-off wheel - the safety guard can be opened once the cut-off wheel comes to a standstill. The machine may be connected to an external exhaust system to remove fumes from the cutting process.

Checking the Contents of Packing

The packing box contains the following items:

- 1 Magnutom
- 4 Drain pipes for water outlet
- 3 Elbow pipes for water outlet
- 1 Fork spanner 36 mm
- 1 Key for hardware compartment
- 1 Key for door lock
- 1 Coolimat connection kit
- 1 Instruction Manual Set

Unpacking and Placing Magnutom



WARNING

When lifting the machine by the built-in truck lifting point, ensure that the boom is properly secured with the locking pins provided.

- Move the crate as close as possible to the desired location, using a fork lift.
- Remove the sides of the crate.
- Remove the bolts securing Magnutom to the pallet.
- Using the forklift, lift Magnutom approx. 5 cm
- Remove the pallet and the plastic covering
- Lower Magnutom slowly to the ground.
- Using the special rollers, move the machine to its final position.
- Adjust the 6 legs to level the Magnutom.

- Allow Magnutom to reach room temperature before connecting electrical power.
- Remove the lifting slots from under Magnutom and store in a safe place.

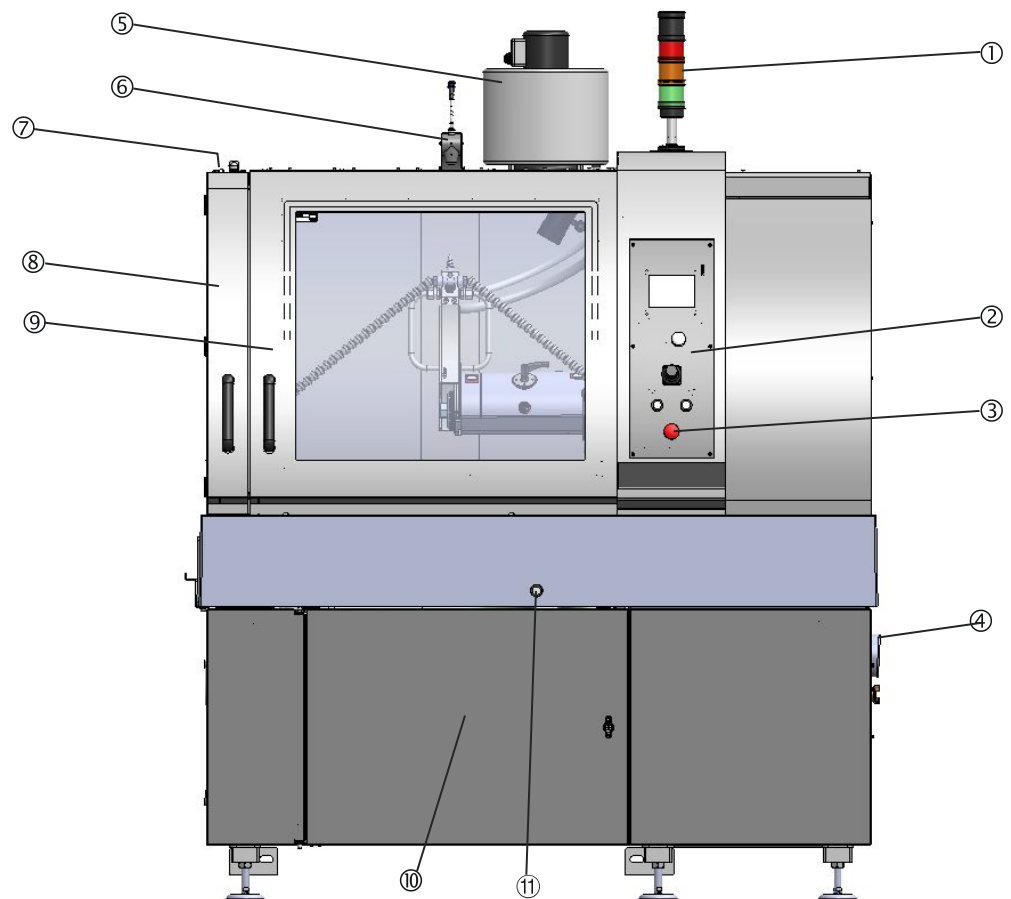


HINT:

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

Getting Acquainted with Magnutom

Take a moment to familiarise yourself with the location and names of the Magnutom components.



- | | |
|----------------------------------|-----------------------|
| ① Signalling light (optional) | ⑦ Safety lock release |
| ② Control Panel | ⑧ Side door |
| ③ Emergency stop | ⑨ Front door |
| ④ Water outlet | ⑩ Access door |
| ⑤ Demister (optional) | ⑪ Hold-to-run button |
| ⑥ Laser straight edge (optional) | |



MAIN SWITCH

The main switch is located on the right hand side of the machine.

- Turn clockwise to switch on the power.



The EMERGENCY STOP is located on the front of the machine.

- Push the red button to Activate.
- Turn the red button clockwise to Release.



NOTE:

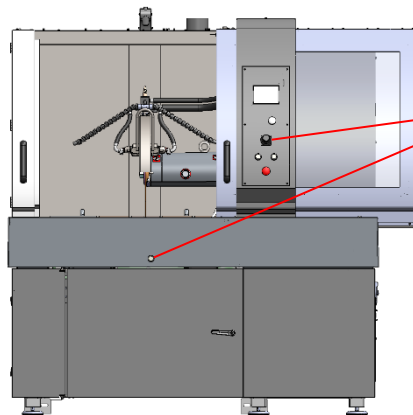
Do not use the Emergency stop for operational stop of the machine during normal operation.

BEFORE releasing (disengaging) the Emergency stop, investigate the reason for activating the Emergency stop and take any necessary corrective action.

Hold-to-run operation

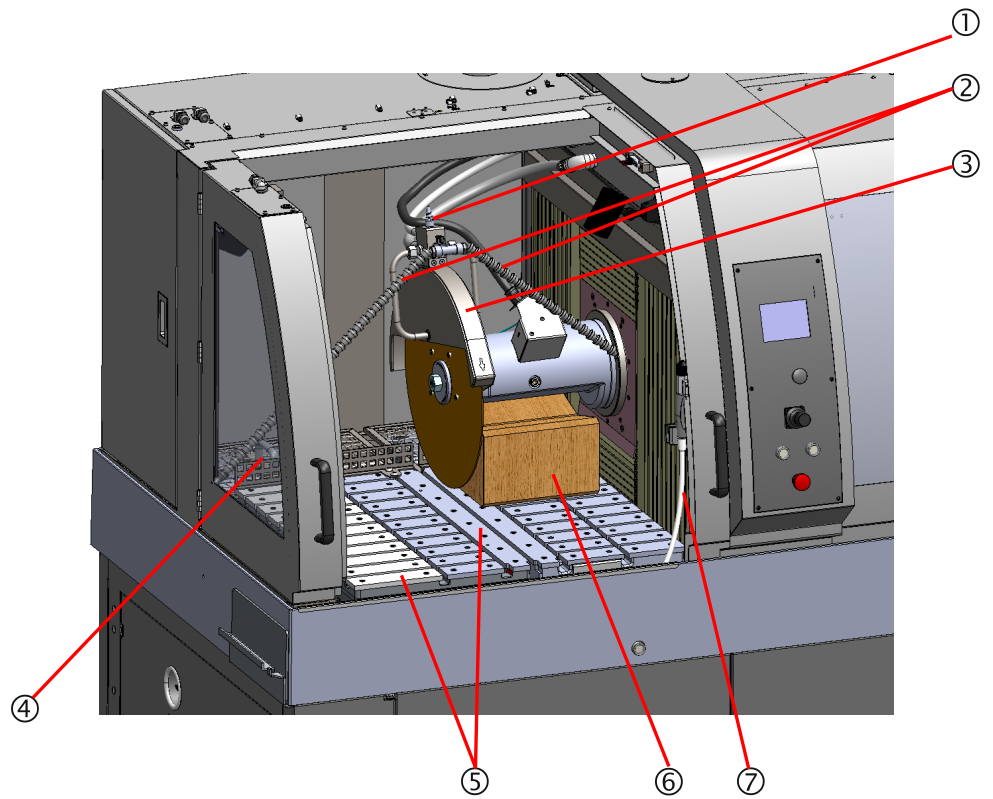
To move the cut-off wheel with the front door or side door open,:

- Press the Hold-to-run button on the front of Magnutom while operating the joystick.



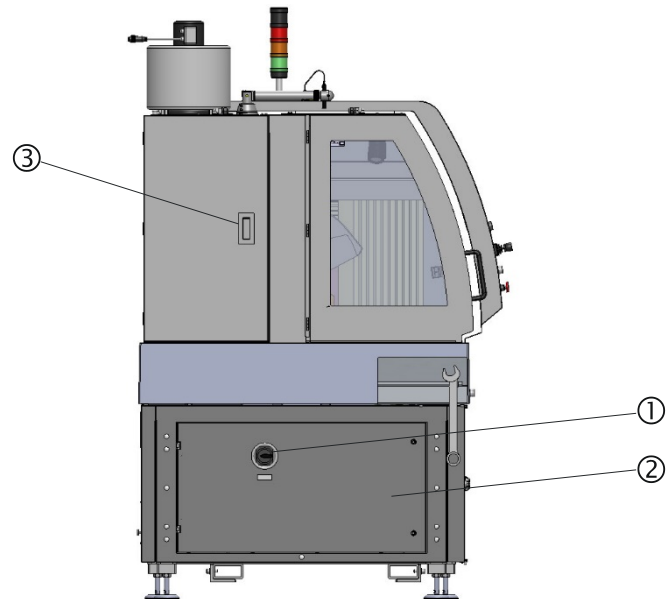
Press Hold-to-run button,
then move the joystick.

Inside the Cutting Chamber



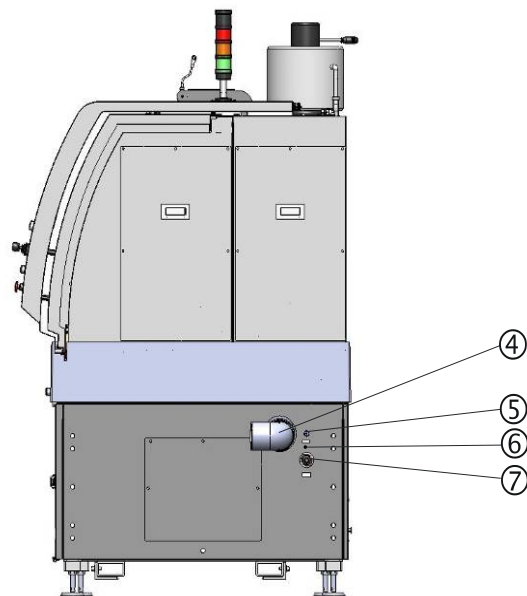
- ① AxioWash nozzle
- ② Flexible water jets
- ③ Guard for cut-off wheel
- ④ Removable grate (for catching specimens/ large pieces of debris)
- ⑤ Cutting table
- ⑥ Support block (only for machine transport. Must be removed before use)
- ⑦ Flushing gun

Side view, left



- ① Main Switch
- ② Access to Electrical connection box
- ③ Inspection door

Side view, right



- ④ Water outlet
- ⑤ 24 V connection for Recirculation Cooling Unit
- ⑥ Compressed air inlet
- ⑦ Quick coupling for water inlet

Power Supply



ELECTRICAL HAZARD

- Switch the power off when installing electrical equipment.
- The machine must be earthed.
- 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.

- Open the electric connection box and connect a 4-lead or 5-lead cable¹ in the following way:

Yellow/green: Earth (ground)

Brown: Line (live) L1, L2, L3

Blue: Neutral

(This terminal is only used for a mechanical connection if there is a Neutral wire in the cable)

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



NOTE:

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

NOTE:

The doors can only be opened when the machine is connected to a power supply and the main power switch is on.

To open the doors when the power is not connected, use the triangle key to release (de-activate) the safety lock.



HINT:

Magnutom cannot operate if the safety lock is de-activated. Remember to re-activate the safety lock before operating Magnutom.

¹ Please see the section on [Technical Data](#) at the rear of the Instruction Manual for recommended cable specifications.

Compressed Air Connections

To connect compressed air:

- Connect an 8 mm compressed air hose to the compressed air inlet.



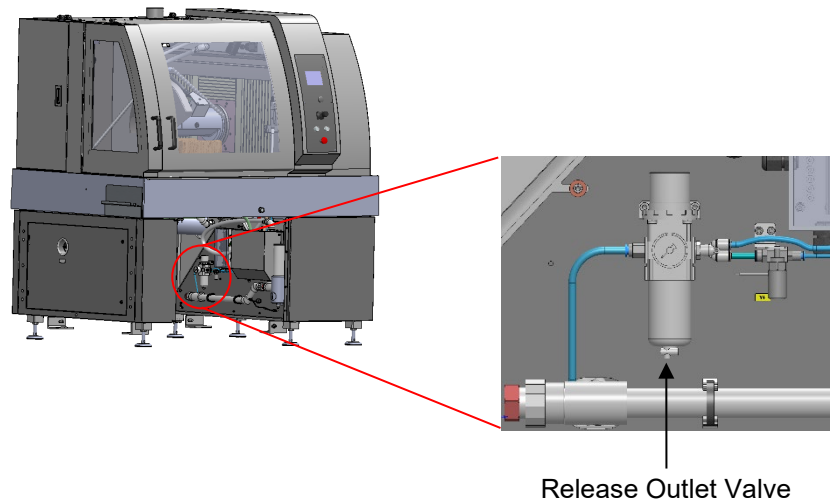
NOTE:

The air pressure must be between 6 bar (87 psi) and 9.9 bar (143 psi).

Emptying the Water / Oil Filter

Magnutom is fitted with a water / oil filter that removes excessive amounts of these substances from the compressed air supply. As a result of this, it is necessary to empty the filter periodically:

- Hold a container under the release outlet valve and press the release valve.



Mounting the Cut-off Wheel



NOTE:

The spindle locks automatically when a door is opened.

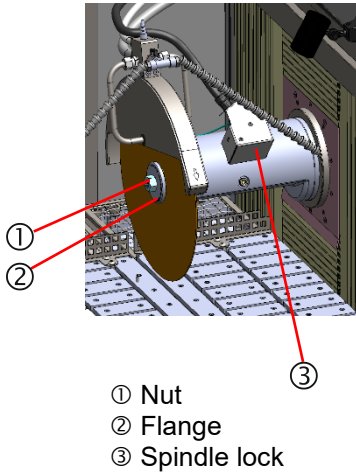
- Remove the support block under the cut-off wheel drive shaft.
- Remove the nut with a fork spanner (36mm).
Note that the spindle has reverse thread.
- Remove the flange.
- Mount the new cut-off wheel.



NOTE:

Conventional cut-off wheels based on $\text{Al}_2\text{O}_3/\text{SiC}$ abrasives should be placed between two cardboard washers, to protect the cut-off wheel and flanges.

- Mount the flanges and nut. Tighten carefully.



Connection to an External Exhaust System

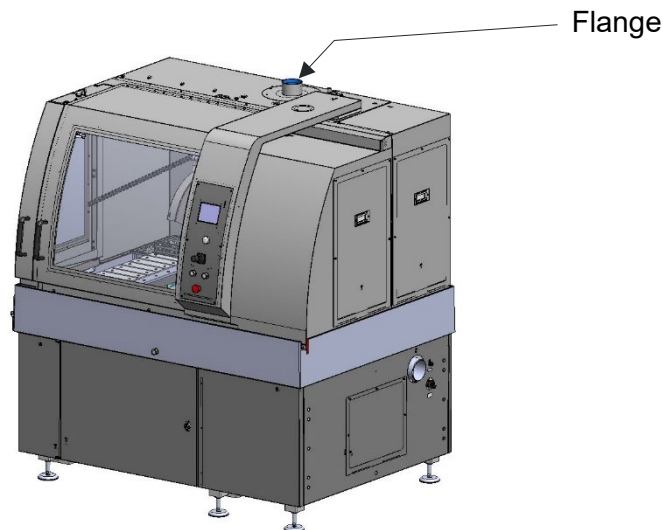
Struers recommends the use of an exhaust system as workpieces may emit harmful gases when cut.

When a central exhaust system is not available, the optional Demister is recommended.

Magnutom is prepared for connection to an exhaust system via a 160 mm (approx. 6¼") fitting on the top of the cabinet.

Recommended minimum capacity for exhaust system: 700 m³/h / 25,000 ft³/h at 0 mm / 0" water gauge.

- Mount an exhaust hose from your local exhaust system onto the flange.



Noise

See Technical Data in the rear of the Instruction Manual for information on the sound pressure level value².

Handling noise (during operation)

Different materials have different noise characteristics.

Decreasing the rotational speed and/or the force with which the cut-off wheel is pressed against the workpiece, will lower the noise.

Processing time may increase.



CAUTION

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

² EN ISO 16089:2015 See chapter Legal and Regulatory for details.

Connecting a Recirculation Cooling Unit

To ensure optimal cooling, Magnutom should be fitted with a Recirculation Cooling Unit. Struers Coolimat-200 is designed for use with large cut-off machines such as Magnutom. Coolimat-200 is available as a Band Filter or a Static Filter unit.



NOTE:

Before connecting the cooling unit to the Magnutom, follow the instructions in the Cooling Units Instruction Manual to prepare it for use.



CAUTION

During cutting, the cooling fluid coming out of the water outlet may be very hot.

Connecting a Coolimat-200 Recirculation Cooling Unit

- Lead the long drain pipe through the opening in the wall of the cabinet, and then connect it to the drain outlet under the cutting table.
- Connect to Coolimat-200 using the pipes and connectors supplied.
- Magnutom, connect the other end to the pump on the cooling unit.
- Connect the 24 V / CAN control cable (supplied with Coolimat-200) to the 24 V socket on the right hand side of Magnutom, and the other end to the Cooli control unit.

Connecting other Struers Cooling Systems

- Slide the cooling unit into the compartment under the Magnutom.
- Connect the 24 V / CAN control cable (supplied with the Cooling System) to the 24 V socket on the right hand side of Magnutom, and the other end to the Cooli control unit.
- Connect the water inlet tube to the quick coupling on the side of Magnutom, connect the other end to the pump on the cooling unit.
- Close the compartment door.

Connecting Other External Filter
Units



NOTE:

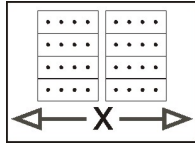
Please contact a qualified electrician to verify that the external filter unit can be used with Magnutom. The electrical diagrams in the Spare Parts section of the manual can be used for identification of the different wires.

The pressure of the cooling fluid supplied to Magnutom must be max. 2 bar.

- Mount an elbow pipe on the drain outlet under the cutting table.
- Lead the drain pipe through the opening in the wall of the cabinet, and then connect it to the elbow pipe.
- Connect to the external unit using the pipes and connectors supplied.
- Connect the water inlet tube to the quick coupling on the side of Magnutom; connect the other end to the pump on the cooling unit.
- Connect a 24 V electric (available as an accessory, part no 15483549) to the 24 V socket on the right hand side of Magnutom, and the other end to the external unit.
The electric 24 V signal (max 200 mA) can be used to start a pump or open a magnetic valve for the water supply. It might be necessary to use a relay to control connected equipment.

Moveable X-Table (option)

The X-table option is a motor driven, movable table. The table can be moved left to right by moving the joystick left or right.



X-table.

The X-table option is required to use the Magnutom's MultiCut functions.

Positioning an X-table

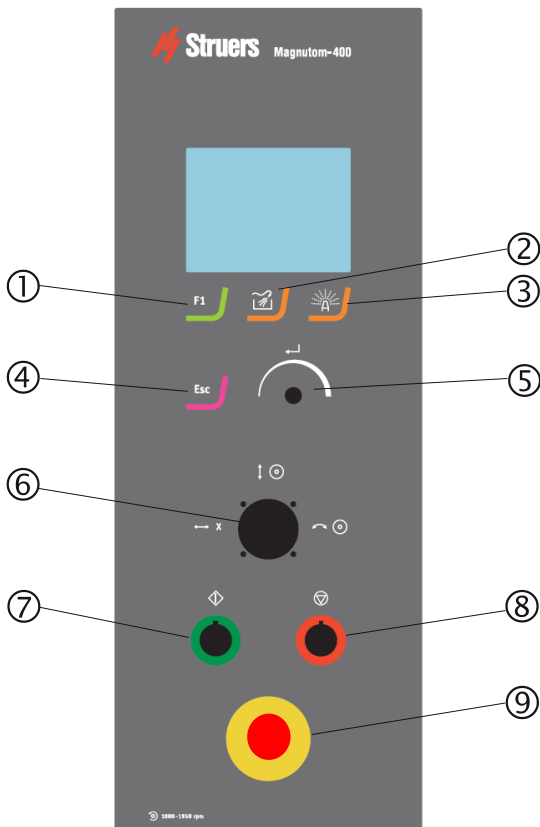
Before cutting the workpiece, position it by moving the X-table to its start point, using the joystick.

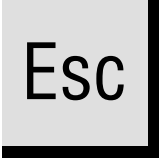
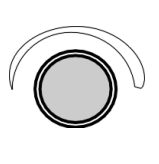
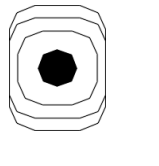
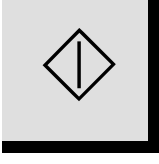
If doors are open, press the hold-to-run button and move the table with the joystick.

2. Basic Operation

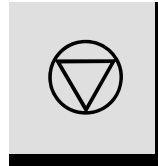
This chapter describes the basic operation of Magnutom.
Information on the advanced functions can be found in the Advanced Operation section of the Instruction Manual.

Using the Controls Control Panel of Magnutom



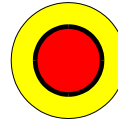
Name	Key	Function
1 FUNCTION KEY		Menu dependent multi-function key. See the bottom line of the individual screens.
2 FLUSH		Starts/ Stops water flow to the flushing gun.
3 AxioWash		Starts AxioWash cycle.
4 ESCAPE		Moves one step backward in menus. If modified parameters have not been stored, they are aborted.
5 TURN/ PUSH KNOB		Multifunction knob. Push knob to select function. Turn knob to move the cursor or to adjust settings. Push knob to store modified settings.
6 JOYSTICK		Move up- or downwards to position cut-off wheel. Twist to move forwards/backwards. Move left-or right to position the x-table (option)
7 START		Starts the machine and recirculation unit and/or band filter.

8
STOP



Stops the machine and recirculation unit and/or band filter.

9
EMERGENCY
STOP



Push the red button to Activate.
Turn the red button to Release.

Sleep Mode

If the Magnutom has not been used for 15 minutes, the backlight is dimmed and the cutting chamber light is switched off. This is to increase their lifetimes.

- Push any Control Panel key to reactivate the backlight and the light.

Using the Joystick

The joystick can be used to rapidly advance the cut-off wheel towards the workpiece (for example, if the cut-off wheel has been changed whilst cutting a workpiece).

The joystick can also be used to move the cut-off wheel during the cutting process –

Models with X-table

Use the joystick to move the X-table.

AutoCut Off – to **quickly** move the cut-off wheel towards the workpiece and move the cut-off wheel position during cutting.

AutoCut Simple or Program – to move the cut-off wheel position during cutting.



NOTE:

To avoid damage to the cut-off wheel;

- Forward movement is limited to 3 x the pre-set Feed Speed
- Backward movement is limited to 5 x the pre-set Feed Speed.

Magnutom is also equipped with an automatic detection system when the cut-off wheel comes into contact with the workpiece. However, certain combinations of a small workpiece and angle of approach can result in the workpiece not being detected automatically.

NOTE:

Take care when positioning the cut-off wheel.

A collision with the workpiece or clamping tool may damage the cut-off wheel

Signals

Cutting chamber lights

The Cutting chamber lights will flash if Magnutom has been idle for 30 seconds after a cutting process is completed.
(The lights will not flash if the operator has interacted with Magnutom)

Signalling light (option)

Signalling light

The optional signalling light mounted on top of Magnutom signals the current condition of the machine.

Green	Magnutom is busy cutting.
Yellow	Attention required. Cutting process is complete and Magnutom is idle
Red	An unexpected stop has occurred and requires immediate attention

Beeps

The "Signalling light sound" is a configurable signal for directing attention to the some of the state changes to "Emergency" and "Stopped".

Emergency state:	signaled by a repeated series of a beep and a short pause
Stopped state:	signaled by a repeated series of a beep and a long pause

The beeps can be stopped by acknowledging the pop-up message.

Overview of Signals*

State	"Operating" Green light Operation is in progress.	"Stopped" Yellow light Operation is stopped. A caution or marginal condition is detected, and attention is required.	"Attention" Yellow light Stopping is impending. A caution or marginal condition is detected, and attention is required.	"Emergency" Red light Operation is stopped. A protective device is engaged, or immediate action is required to deal with a hazardous condition.
Event				
Start or Continue is pressed	State change ⇒ Operating	State change ⇒ Operating		
Process is complete			State change ⇒ Stopped	State change ⇒ Stopped
Manual stop is pressed			State change ⇒ Stopped	State change ⇒ Stopped
A door is opened			State change ⇒ Emergency	State change ⇒ Emergency
Emergency stop is pressed			State change ⇒ Emergency	State change ⇒ Emergency
Thermal overload	Beep ON	State change ⇒ Emergency Beep ON	State change ⇒ Emergency Beep ON	State change ⇒ Emergency Beep ON

* when optional Signalling light is fitted.

Navigating the Software

Use the TURN/PUSH knob to navigate the software:



Push knob to select a menu or item.



Turn knob to move the cursor or to adjust settings.



Press knob to store modified settings.

Esc

Press Esc to return to the previous menu (without saving any modified settings).

The *Main menu* is the highest level in the menu structure. Cutting methods can be selected and edited and/ or started.

Other functions such as defining user cut-off wheels or changing operation mode can be carried out in the [Maintenance](#) and [Configuration](#) menus. Details of these functions can be found in the **Reference Guide** section of the Instruction Manual.

Setting the Language

When the Magnutom is switched on for the first time, a screen on the control panel prompts you to select your preferred language. Then to set the date and time.

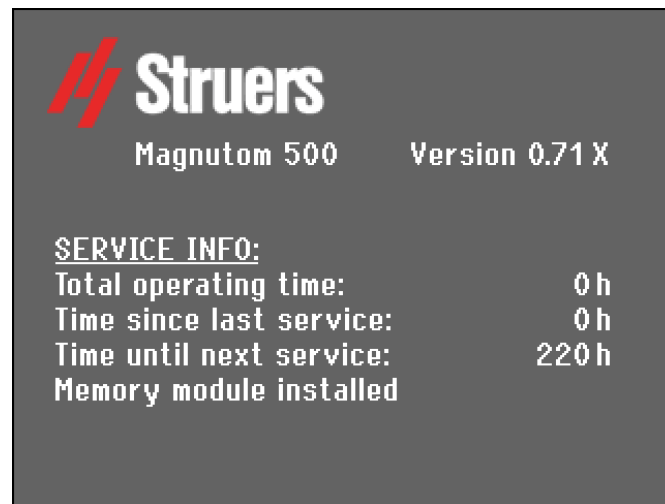


From the pop-up menu, select your preferred language by turning the knob then enter the setting by pushing the knob.



Press Esc to move to the Main Menu.

Whenever the Magnutom is switched on the screen displays the version number of the software.



Additionally some service information is supplied; the total operation time and the time since the last service of the machine.

The display will then change to the last screen shown before Magnutom was switched off.

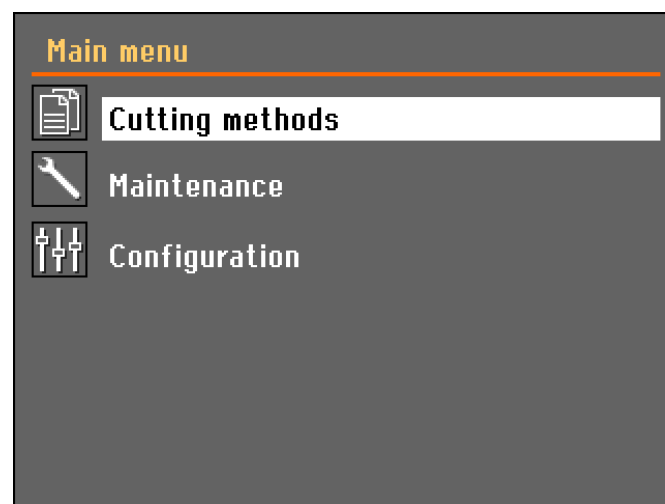
Main Menu

During normal operation, immediately after start up, where the splash screen is displayed, the software goes to the screen that was used before the machine was switched off. Thus you can continue exactly where you left last time the machine was used.

The Main Menu is the highest level in the menu structure. From this menu, you can enter all the other menus.

To enter the *Main menu*:

- Press Esc until the *Main menu* is displayed.



Changing the Language



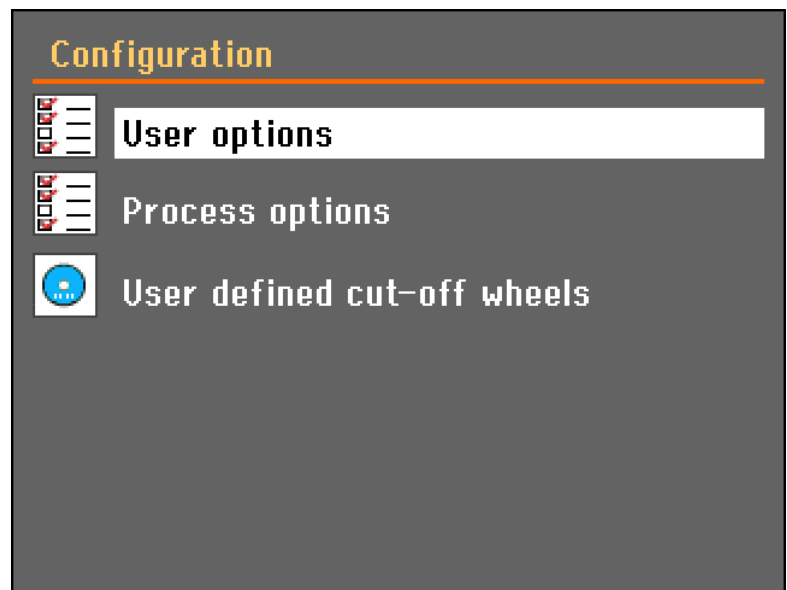
Turn the knob to select Configuration.



Push knob to activate the Configuration Menu.



Turn the knob to select Options



Push knob to activate the Options Menu.



Turn knob to select Language.





Push knob to activate the Select language pop-up menu.



Turn knob to select the language you prefer.



Push knob to accept the language.

The Configuration menu now appears in the language you have chosen.

Check if there are any other settings that need changing in the Options menu. If not, Push ESC to return to the Configuration menu.

Otherwise use the Turn/Push knob to select and change the required parameters.

Editing Numeric Values



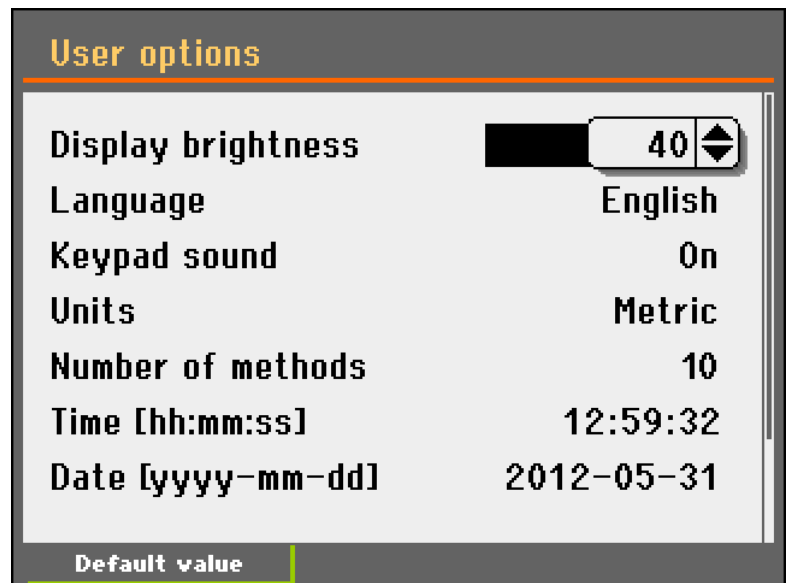
Turn knob to select the value to be changed, e.g. Display brightness:



Push knob to edit the value.



A scroll box appears around the value.



↓ **NOTE:** If there are only two options, the popup box is not displayed. Pressing the knob (Enter) will toggle between the 2 options.



Turn knob to increase or decrease the numeric value (or to toggle between the two options).



Push knob to accept the new value. (Pressing Esc, aborts the changes, preserving the original value.)

Editing Alphanumeric Values

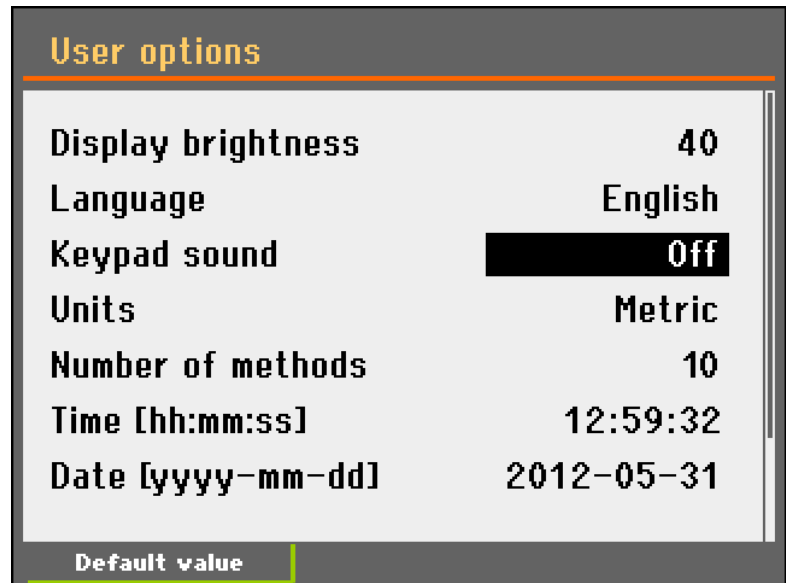


Turn knob to select the text value to be changed, e.g. Keyboard sound:





Push knob to toggle between the 2 options.



NOTE: If there are more than two options, a popup box is displayed. Turn knob to select the correct option.



Press Esc to accept the option and return to the previous menu
Or turn knob to select and edit other options in the menu.

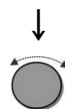
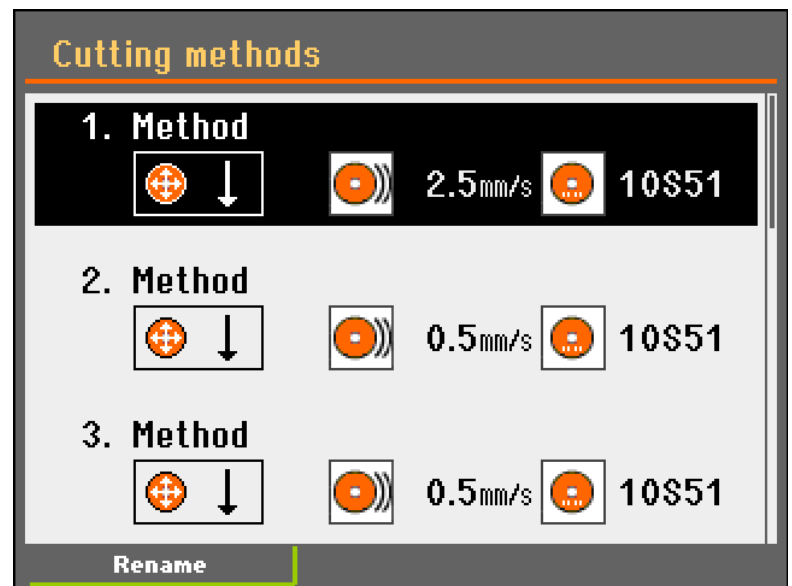
Editing Cutting Method Names

Up to 10 cutting methods can be saved in the database.



Push knob to open the *Cutting methods* menu.





Turn knob to select a method.



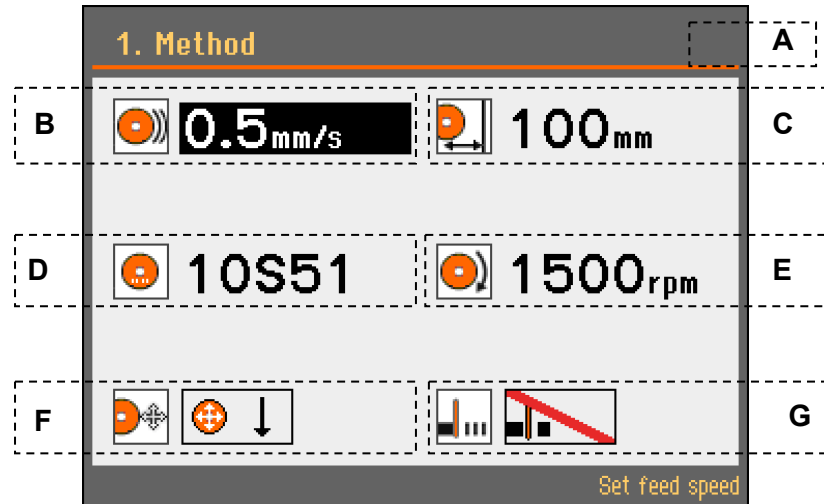
F1 Press F1 to open the *Text editor* menu.



Save the changes in the database by selecting *Save & Exit*.

Changing Cutting Mode and Cutting Parameters

Cutting methods can be edited from the editing menu.



- A** Cutting method number
- B** Feed speed
- C** Cut Length
- D** Cut-off wheel
- E** Cut-off wheel speed
- F** Cutting mode
- G** MultiCut setup (only available with x-table option)

Editing the Parameters

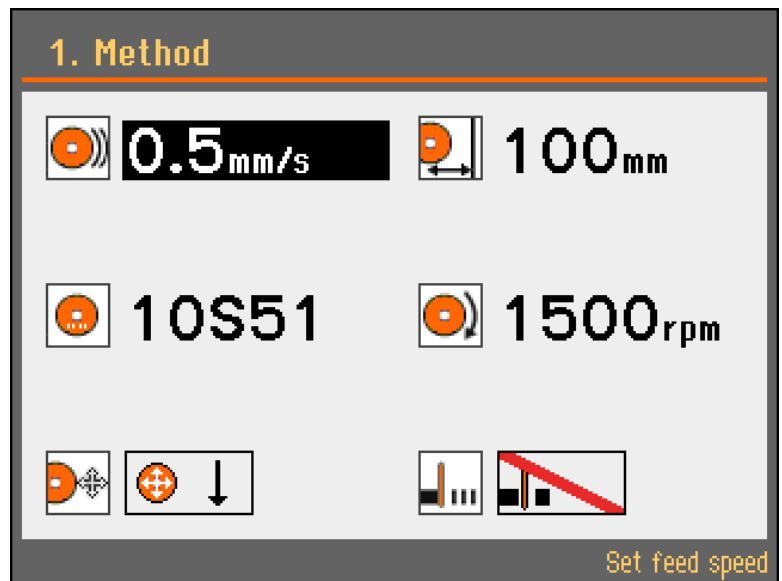
The cutting parameters can be set both prior to and during cutting. From the *Cutting methods* menu, select a cutting method:



Push knob to open the editing menu.



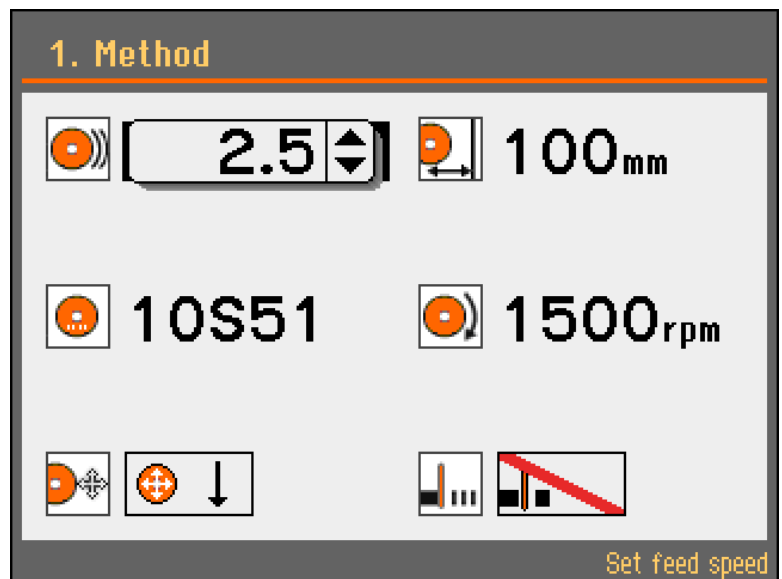
Turn knob to highlight the parameter to be edited e.g. feed speed.



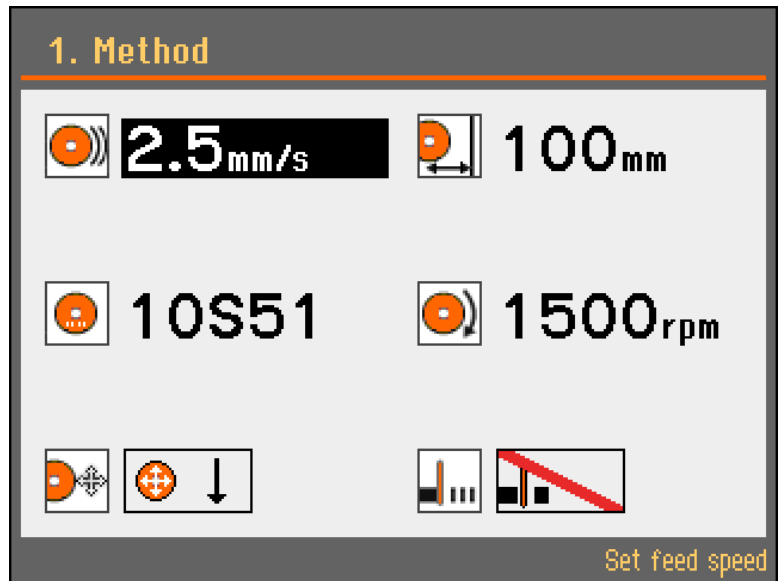
Push knob to select the parameter.
A pop-up menu appears.



Turn knob to adjust the value of the parameter.



Push knob to save the setting.



Feed speed



Cut length



Setting a stop position

Can be set to values between 0.1 - 10 mm/sec, in steps of 0.1 (0.002-0.2 "/s).
Default value: 0.5mm/s

There are two ways to set the stop position: Setting a *Cut length* or *AutoStop*.

- Select **Cut-off wheel** and Push the knob.
- The *Cutting mode setup* menu will appear.

Can be set to values between 1- 385 mm, in steps of 1 mm.
Default value: 100 mm.



NOTE:

The available Cut length will differ depending on the cutting mode used. If the value selected is greater than this, a message will appear suggesting the Cut length which is available.

Cut length can also be set when editing the Cutting mode.

AutoStop

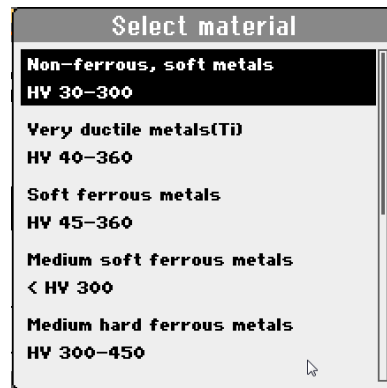
Adjust the stop position to '0'mm (Auto).
When the *AutoStop* function is selected, the machine automatically stops when the workpiece has been cut through.

For a detailed description of the **Stop Settings** and how they can be used, see the **Reference Guide** section of the Instruction Manual.

Cut-off wheel



- Select **Cut-off wheel** and Push the knob.
- Select the cut-off wheel from the pop-up menu.
When Wheel Selection Mode is set to 'Intelligent', the *Material guide* menu will appear.
Select the hardness of your Material in the pop-up menu and Magnutom will suggest the suitable Struers cut-off wheel, and automatically retrieve the recommended rotational speed for that specific wheel.



- Select the diameter of the cut-off wheel:
Magnutom-500 432 or 508mm,
Magnutom-400 432 mm only

Wheel Speed



Can be set to values between :
1000- 1950 mm (Magnutom-400)
1000- 1850 mm (Magnutom-500)

in steps of 50 rpm.
Default value: 1500 rpm.

Cutting Mode



4 cutting modes are available:

Cutting mode can also be selected in the *Cutting mode setup* menu when editing the Cut length.

Icon	Cutting Mode	Typical use:
	Z Vertical cut	Vertical cut-length can be set. Cutting of larger samples
	Y Horizontal cut.	Horizontal cut-length can be set. Cutting of smaller samples
	Z+Y Combined cut	Vertical and Horizontal cut-length can be set. Cutting of extra-large samples
	AxioCut Combined cut	Combined cut. Cutting of extra-large and extra hard samples:- the cut-off wheel moves downwards in predefined steps

(Maximum cutting capacity is achieved using **Y+Z** or **AxioCut**).

For a detailed description of **AxioCut** and how it can be used, see the **Reference Guide** section of the Instruction Manual.

Sampling Method



5 sampling methods are available:

Icon	Mode	
	Off	Single cut.
	MultiCut 1	Cut up to 9 slices of equal thickness
	MultiCut 2	Cut up to 9 slices of varying thickness
	MultiCut 3	Cut up to 9 slices of varying thickness counted from a common 0-position
	MultiCut 4	The thickness of the cuts are set by moving the joystick then pressing Enter to set the position of the cut

For a detailed description of the **MultiCut** option and how it can be used, see the **Reference Guide** section of the Instruction Manual.

Changing the Cut-off Wheel

- Remove the nut with a fork spanner (36 mm).
- Remove the flange and the cut-off wheel.
- Mount the new cut-off wheel.
- Mount the flange and nut. Tighten carefully and close the guard.



NOTE:

Conventional cut-off wheels based on $\text{Al}_2\text{O}_3/\text{SiC}$ abrasives should be placed between two cardboard washers, to protect the cut-off wheel and flanges.

For maximum precision with diamond or CBN cut-off wheels, do not use cardboard washers.

Clamping the Workpiece

X-Table Models (option)

- Position the x-table to allow room for the required number of slices or the size of the workpiece to be cut.
If this is not necessary, the tables should be kept close together to support the sample as much as possible during cutting.



CAUTION

Use safety shoes when handling large or heavy workpieces.



NOTE:

The Max load on the X-table is 300 kg / 660 lbs.

All Models

- Move the cut-off wheel backwards to the rear of the cutting chamber for optimum access to the cutting table.
- Clamp the workpiece with the clamping device of your choice e.g. a quick clamping device.
 - Place the workpiece between the clamp and the backstop.
 - Push the clamp towards the workpiece, and lock the quick clamping device with the locking handle.
- Ensure that only one of the quick clamping devices is tight, the other device should only press lightly.
Use support tools if the geometry of the workpiece makes support necessary.

Before starting to cut, check that the cut-off wheel or cut-off wheel guard will not come into contact with the clamping device during the cutting process.

When using MultiCut programs, check that the cut-off wheel will not be obstructed by the workpiece or the clamping device during its X-axis movement.

Cutting on Magnutom

Starting the Cutting

AutoCut: Off

For a detailed description of the **AutoCut** option and how it can be used, see the **Reference Guide** section of the Instruction Manual.

- Position the cut-off wheel by slowly moving it to within 1 - 2 mm of the sample.



NOTE:

Take care when moving the cut-off wheel. If moved too quickly and it comes into contact with the workpiece, it is possible that the cut-off wheel will break.

- Close the protection door.
- Press START 
 - The cut-off wheel starts rotating, the cooling fluid starts running and the cut-off wheel will slowly move down into the workpiece at the pre-set Feed speed.



CAUTION

Keep fingers clear of door frames when closing the doors.



CAUTION

Use working gloves as workpieces and specimens may be both very hot and have sharp edges.

AutoCut: Simple

- Press START ◇.
 - The cut-off wheel will advance towards the workpiece at a maximum speed of 5mm/s.
 - After contact with the workpiece, the cut-off wheel is automatically retracted 2 mm, to be ready for cutting.
 - The cut-off wheel will then continue to move into the workpiece at the pre-set Feed speed.

AutoCut: Program

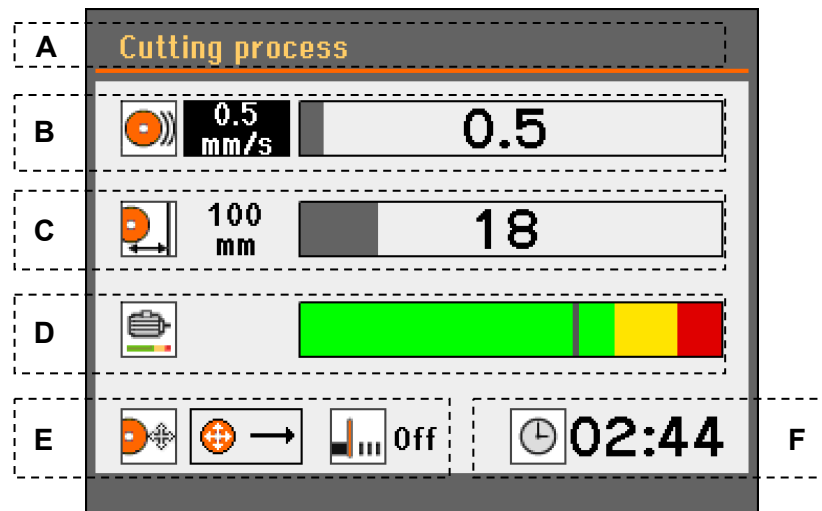
When AutoCut has been pre-programmed:

- Press START ◇.
 - The cut-off wheel will advance at high speed to the pre-programmed start position.
 - After reaching this position the speed is reduced until contact is made with the workpiece.
 - After contact with the workpiece, the cut-off wheel is automatically retracted 2 mm, to be ready for cutting.
 - The cut-off wheel will then continue to move down into the workpiece at the pre-set Feed Speed.

The Cutting process screen

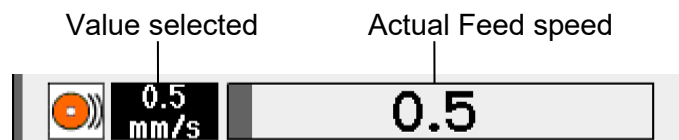
The Cutting process screen shows information about the cutting process including:

- Cutting Parameters
- Motor Information
- Cutting Mode and a Countdown timer

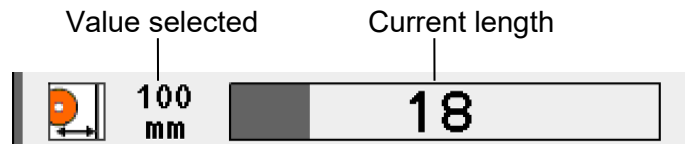


- A Heading
- B Feed speed
- C Length of cut
- D Motor load
- E Cutting Mode
- F Timer Countdown

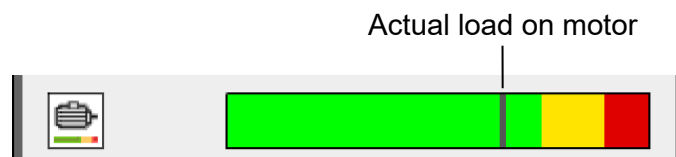
Feed speed



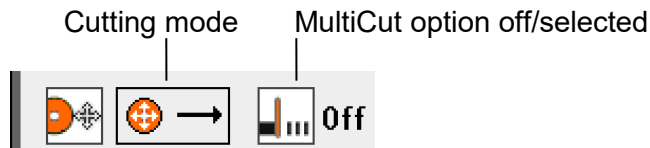
Length of cut



Motor load



Cutting Mode



(The MultiCut option is only shown when an x-table is mounted.)

Timer Countdown



An estimate of time remaining for the cutting process.
(When AutoStop is selected, a countdown timer will not be displayed.)

Manual Stop

Magnutom automatically stops cutting when the workpiece is cut through but can be stopped at any time during operation by pressing STOP ⏏.

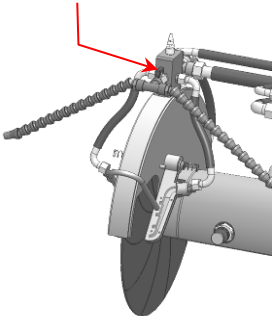
- Press STOP ⏏ to manually interrupt the cutting process.

Re-starting cutting

- Press START ⏏ to resume cutting.

Additional cooling

To activate jets,
turn valve



When cutting hollow and/or thin workpieces, two flexible water jets are provided for workpiece cooling.

- Position the cooling jets to the left and right of the cutting area.
- Turn the valve on the jet to a position parallel to the hose to activate the cooling jets. The cooling liquid will flow as soon as the cutting starts.
- When cutting is finished, return the valve on the jet to horizontal.



NOTE:

When using the flexible water jets, cooling liquid is diverted from the integrated water jets positioned over the cut-off wheel. The flexible water jets should not be used when cutting workpieces of large diameter as cooling will be less efficient. They are designed to supply a more localized cooling e.g. the internal surface of hollow workpieces.

3. Maintenance

Proper maintenance is required to achieve the maximum uptime and operating lifetime of the machine. Maintenance is also important in ensuring Magnutom'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 Magnutom, Struers strongly recommends daily cleaning of the cutting chamber. Clean the cutting chamber thoroughly if the Magnutom is not to be used for a longer period of time.



NOTE:

Accumulated dirt and swarf can restrict or cause damage to the movement of the cutting arm or x-table (if this option is installed).

Recirculation Cooling Unit

For Maintenance of the *Recirculation Cooling Unit*, please refer to the Recirculation Cooling Units Instruction Manual.

Daily Machine

- Clean all accessible surfaces with a soft, damp cloth.



HINT:

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.

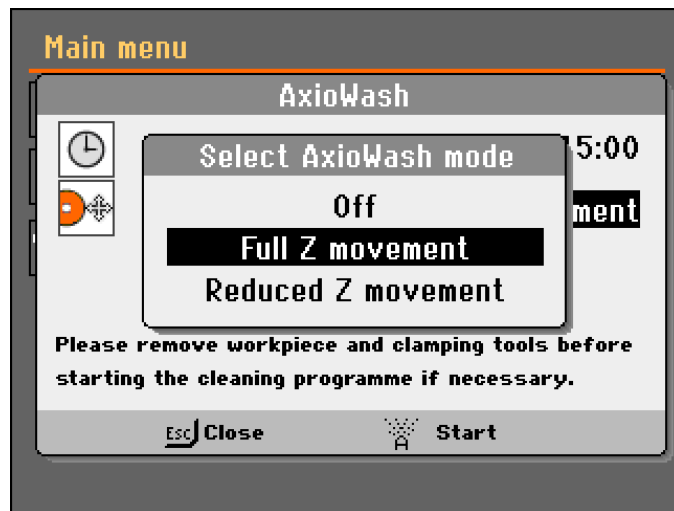
AxioWash

The AxioWash cleaning program is an efficient way to automatically clean the cutting chamber. The following parameters can be adjusted: time, cut-off wheel movement or X-table movement (with X-table option).

Time

Can be set to values between 30 sec - 30 min, in steps of 30sec.
Default value: 15 minutes

Cut-off wheel movement

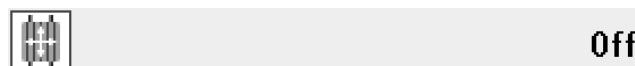


Off:	cut-off wheel arm stays in the current position.
Full Z movement:	cut-off wheel arm cycles backwards and forwards and between the lowest and the highest Z position.
Reduced Z movement:	cut-off wheel arm cycles backwards and forwards and between two Z positions – the z-position of the cut-off wheel arm when AxioWash is started and the highest Z position.

Reduced Z movement is useful as it does not require the clamping tool or workpiece to be removed before AxioWash. Before using this AxioWash function, move the cut-off wheel to the lowest Z position where there will be no collision with clamping tools/ workpiece.

X-table movement

When an X-table is fitted, AxioWash can be programmed to run with X-table movement set to **On** or **Off**.



- Clean the cutting chamber.

Cleaning the Cutting Chamber

- Clean the cutting chamber , especially the cutting table the T-slots and the bellows.
Clean automatically (using AxioWash) and then manually (using the flushing gun).

Automatic cleaning: AxioWash

To start the AxioWash function:

- Remove the workpiece and tools from the cutting chamber.
- Close the adjustable cleaning nozzles.
- Close the protection front door and the side door.
- Press the AxioWash key on the Control Panel to activate the AxioWash PopUp.
If required, adjust the AxioWash parameters - time, cut-off wheel movement or X-table movement – then press the AxioWash key again to start cleaning.
The AxioWash program will then run for the preset time.

When AxioWash is finished:

Manual cleaning

- Press the Flush key on the control panel to activate the recirculation pump.
- Lift the flushing gun from its holder.
- Point the flushing gun towards the bottom of the cutting chamber.
- Turn on the water by pressing the rear of the nozzle.
- Clean the cutting chamber thoroughly.
 - Clean the spaces between the T-slots on the cutting table.
 - Clean the space around the cutting table.
 - Clean the bellows thoroughly, in particular the folds where swarf can accumulate.
- Turn off the water by pressing the Flush key again.
- Return the flushing gun to its holder.



CAUTION

Wear gloves and goggles when using the flushing gun. The fluid is contaminated with metal particles and may be hot, too.



CAUTION

Risk of wet floor/ slipping hazard.
Do not clean the roof of the cutting chamber or directly on the doors with the flushing gun.
Wear work shoes with slip-resistant soles.

Maintenance of Cut-off Wheels

Storage of Bakelite Bonded Al_2O_3 Cut-off Wheels

This type of cut-off wheel is sensitive to humidity. Therefore, do not mix new, dry cut-off wheels with used, humid ones. Store the cut-off wheels in a dry place, horizontally on a plane support.

Maintenance of Diamond and CBN Cut-off Wheels

The precision of diamond and CBN cut-off wheels (and thus the cut) depends on how carefully the following instructions are observed:

- Never expose the cut-off wheel to overload, such as heavy mechanical load, or heat.
- Store the cut-off wheel in a dry place, horizontally on a plane support, preferably under light pressure.
- A clean and dry cut-off wheel does not corrode. Therefore, clean and dry the used cut-off wheel before storing. If possible, use ordinary detergents for the cleaning.

Weekly

The machine should be cleaned regularly, in order to avoid damaging effects to the machine and the specimens from abrasive grains and metal particles.

- Clean painted surfaces, and the control panel with a soft damp cloth and common household detergents.
For heavy duty cleaning, use Struers Cleaner (Cat. No. 49900027).
- Clean the doors with a soft damp cloth and a common household anti-static window cleaning agent.
Do not use harsh or abrasive cleaning agents.



NOTE:

Ensure that no detergent or cleaning agent residue is flushed into the cooling unit tank; excess foaming will occur.

Cleaning the Cutting Chamber

- Remove the clamping device(s).
 - Thoroughly clean and lubricate the clamping device(s).
 - Store the clamping device(s) in a dry place or replace on the cutting table after cleaning.
- Clean the cutting chamber thoroughly:
 - Remove the grates at the rear of the cutting chamber and clean.
 - Clean along the length of the guide shafts with the flushing gun and a brush to remove accumulated swarf.
 - Clean under the cutting table with the flushing gun and a T-slot cleaner (Cat. No. 05486910) or brush to remove accumulated swarf.

Cooling Unit

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

Monthly

Replacing the Cooling Fluid

- Replace the cooling fluid in the Recirculation Cooling Unit at least once a month.

Lubricating the Movement Mechanisms

Magnutom is equipped with an automatic lubrication system for the movement mechanisms.

X-Table Models (option)

To perform lubrication of the X-table:

- Move the X-table fully to the left, then fully to the right.

Maintenance of Clamping Devices



NOTE:

It is recommended to thoroughly clean and lubricate the Quick Clamping Device and Vertical Quick Clamping Device at regular intervals.

Maintenance of the Clamping Devices is part of the regular yearly Struers Service.

Maintenance of Cutting Table

The stainless steel bands forming the cutting table should be replaced if they have become worn or damaged. The bands are available as spare parts.

To allow humidity to escape from the cutting table and chamber, it is recommended to leave the hood open when the machine is not in use.

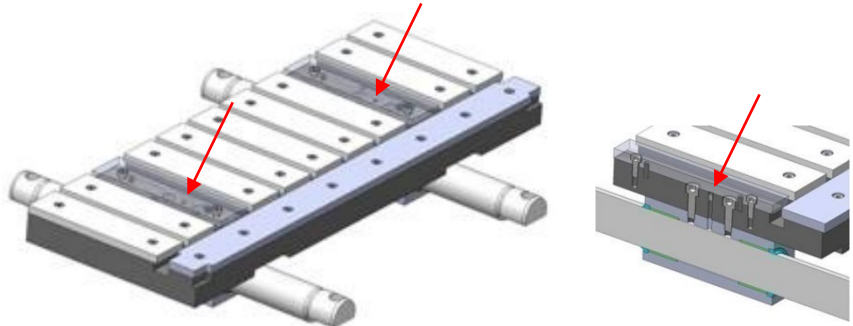
Lubricating the Cutting Table Part of Struers ServiceGuard

To maintain the optimum performance of Magnutom, lubricate the cutting table at regular intervals (approx every 100 hours). Check the service info displayed on the screen at start-up to monitor the actual number of usage hours. After lubrication of the x-table, note the date and number of service hours on the Maintenance Log table.

Lubricating the Guide Shafts (models with optional X-table)

A bottle with oil for lubricating the guide shafts and slide bearings is supplied with Magnutom. When all the oil has been used, refill with eg. Shell TELLUS oil S100.

- Remove the stainless steel bands located over the guide shafts (see illustration).
- Remove the M6 screws.



- Fill the holes with approx. 10ml Oil or until the reservoir is full.
- Re fit the screws.

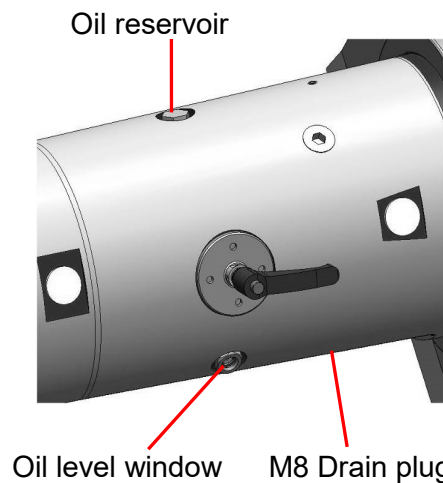
Lubricating the Drive Shaft Spindle

Part of Struers ServiceGuard

The oil in the spindle of the cut-off wheel drive shaft should be replaced after 1 year or 1,500 hours.

To replace the oil in the spindle:

- Move the drive shaft as far forwards and as low down as possible.
- Place a bowl under the M8 drain plug (on the bottom of the drive shaft).
- Remove the plug from the oil reservoir, then unscrew the drain plug on the bottom and allow the oil to drain.
- When the spindle is empty, replace the drain plug.
- Fill the spindle by pouring 140ml of oil into the reservoir. (Shell Morlina S2 B32 is recommended, requires 2 bottles of Cat. No. R6080852).
- Replace the plug.



NOTE:

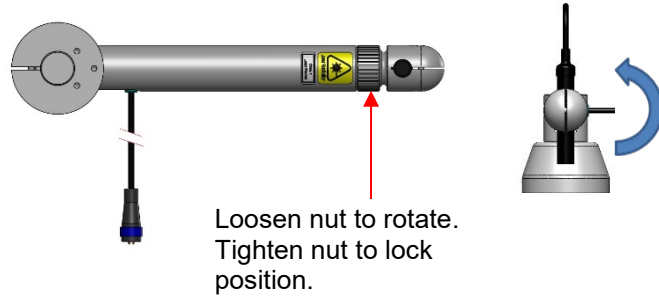
If the oil in the reservoir appears milky; this indicates that water has entered the oil reservoir. Call a Struers Service Technician to clean the reservoir.

Adjusting the Laser

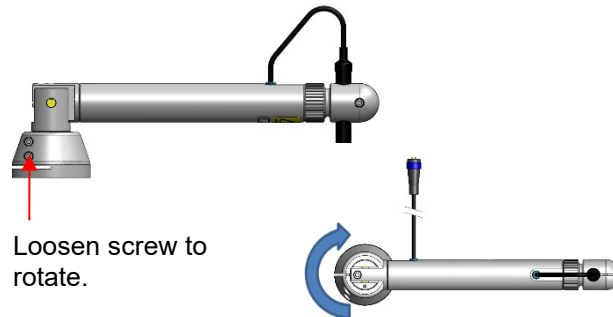
Option

Rotating the laser:

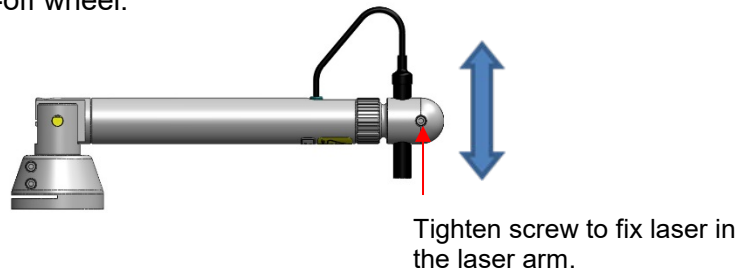
- Adjust the position of the laser so that the laser beam is aligned with the cut-off wheel.



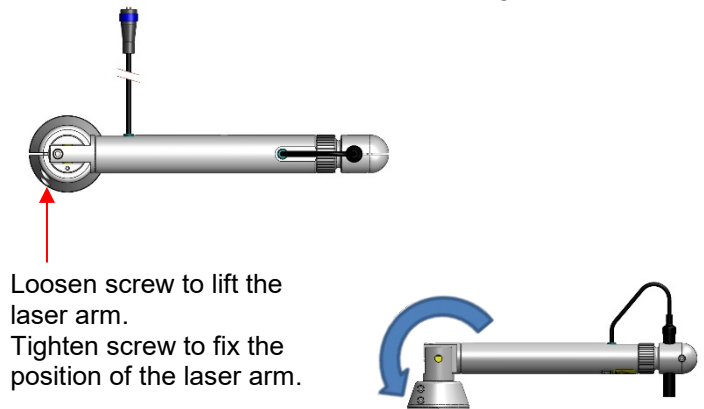
Rotating the laser arm:



- Loosen screw and rotate laser until the laser beam is parallel to the cut-off wheel.



- The laser arm can be raised to access the cutting chamber from above.



Yearly

Inspection of Doors

Part of Struers ServiceGuard

The protective doors consists of a metal frame and a composite material (PETG) screen that protects the operator.

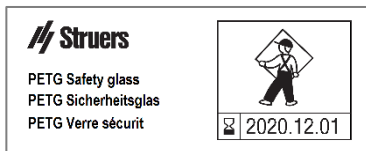
- Visually inspect the door and the screen for signs of wear or damage (e.g. dents, cracks, damage to edge sealing).



NOTE:

Carry out inspection at more regular intervals if Magnutom is used for more than one 7 hour shift a day.

Replacing the Screen in the Doors



To ensure its intended safety, the PETG screen must be replaced every 5 years³. A label on the screen indicates when it is due to be replaced.

The screen should be **replaced immediately** if it has been weakened by collision with projectile objects or if there are visible signs of deterioration or damage.

Inspection of the doors and replacement of the screen are part of ServiceGuard, the Struers range of service plans.

Testing Safety Devices

The doors have a safety switch system to prevent the cut-off wheel from starting while the door(s) is open. Furthermore, a locking mechanism prevents the operator from opening the doors until the cut-off wheel stops spinning.



NOTE:

Remember to test both the front door and the side door.

- Start a cutting process.
- Activate the Emergency-stop.
If cutting and the recirculation pump do not stop, press STOP ◇ and contact Struers Service.
- Activate the Emergency-stop.
Press START ◇.
If cutting or the recirculation pump starts, press STOP ◇ and contact Struers Service.
- Start a cutting process.
- Open a door. Do NOT use force.
If the door opens, press STOP ◇ and contact Struers Service.
- Open a door

³ Replacement after 5 years of the screen is required due to material deterioration.

- Press START ◇.
If cutting and recirculation pump start, press STOP ◇ and contact Struers Service.
- Open the door
- Use the joystick to move the cutting table.
If the cutting table moves, contact Struers Service.



WARNING

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

Spare Parts

Please see [Spare Parts and Diagrams](#) in the **Reference Guide** section of the Instruction Manual.

4. Cautionary Statements

List of Safety Messages in the Manual



WARNING

When lifting the machine by the built-in truck lifting point, ensure that the boom is properly secured with the locking pins provided.



ELECTRICAL HAZARD

- Switch the power off when installing electrical equipment.
- The machine must be earthed.
- 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

During cutting, the cooling fluid coming out of the water outlet may be very hot.



CRUSHING HAZARD

Keep hands clear of X-table while positioning it.



CAUTION

Use safety shoes when handling large or heavy workpieces.



CAUTION

Keep fingers clear of door frames when closing the doors.



CAUTION

Use working gloves as workpieces and specimens may be both very hot and have sharp edges.



CAUTION

Wear gloves and goggles when using the flushing gun. The fluid is contaminated with metal particles and may be hot, too.



ELECTRICAL HAZARD

Disconnection of the power supply may only be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.)



CAUTION

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



CAUTION

Risk of wet floor/ slipping hazard.
Do not clean the roof of the cutting chamber or directly on the doors with the flushing gun.
Wear work shoes with slip-resistant soles.



WARNING

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



WARNING

When lifting the machine ensure that the transport beams are properly secured with the locking pins provided.



WARNING

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



WARNING

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

5. Transport and Storage



ELECTRICAL HAZARD

Disconnection of the power supply may only be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.)

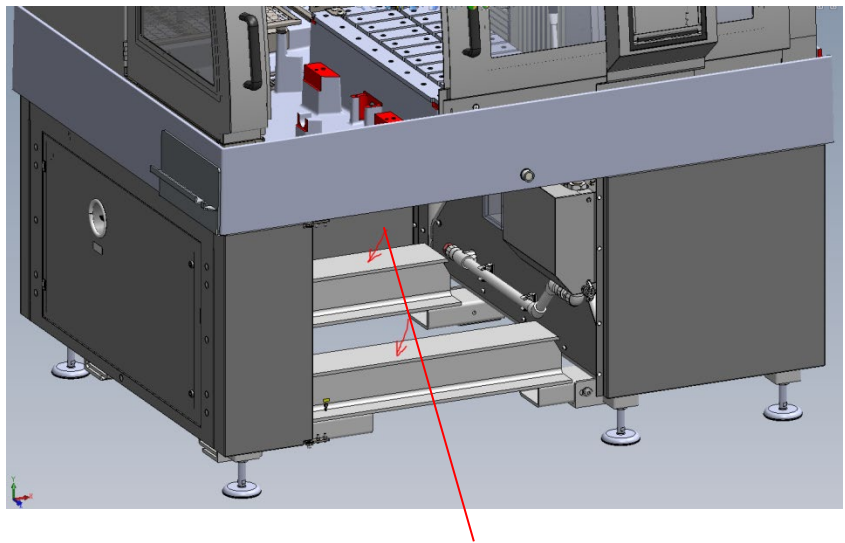


NOTE:

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

Follow these steps:

- Disconnect the power supply, Recirculation Cooling Unit, water and exhaust system.
- Move the Recirculation Cooling Unit.
- Fit the transport beams.



Transport beams



WARNING

When lifting the machine ensure that the transport beams are properly secured with the locking pins provided.

- Secure the cutting arm with the locking system provided.
- Move the machine to its new position.

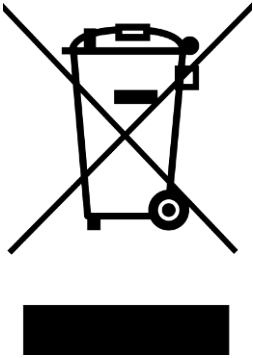
If the machine is bound for long-time storage or shipping, follow these steps:

- Place the machine on the original pallet.
- Secure the machine to the pallet using the original transport brackets.
- Build the crate.
- Place the accessories box and other loose items in the crate. To keep the machine dry, plastic wrap the machine and place a bag of desiccant (silica gel) with the machine.

At the new location, check that:

- The facilities required are in place (power, water, exhaust and permissible load on the floor).
- A copy of the Pre-Installation Checklist is available (if required, contact Struers for a copy).

6. Disposal



Equipment marked with a WEEE symbol  contains 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 in the 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.

Depending on which metals are being cut, it is possible that the combination of the metallic swarf (cutting debris) from metals with a large difference in electro positivity (a large distance apart in the electrochemical series), could result in exothermic reactions when 'favourable' conditions are present.

Therefore, it is always good practice to bear in mind which metals are being cut and the amount of swarf produced.

Examples:

The following are examples of combinations which could result in exothermic reactions if a large amount of swarf is collected during cutting/ grinding on the same machine, and when favourable conditions are present:

Aluminum and Copper

Zinc and Copper



WARNING

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

Reference Guide

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1. Advanced Operation

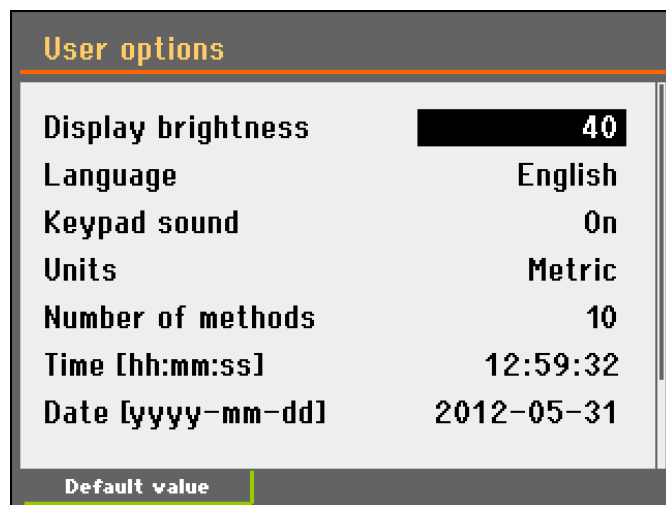
Configuration Menu

A number of different settings and parameters can be set or adjusted from the *Configuration* menu.

There are 3 sub menus:

- User options
- Process options
- User defined cut-off wheels

User options menu



Default value: To re-set the setting to default value, press the F1 key on the Control Panel.

Display brightness:

The brightness of the display can be adjusted to suit individual preferences

Can be set between 20-100

Default value: 40

Language:

The language can be set to English (default), German, French, Spanish, Japanese, Chinese, Italian, Russian or Korean.

Keypad sound

Can be set to On or Off

Units:

The units displayed can be set to Metric (mm/s, mm) (default) or Imperial (mil/s, inch).

Number of methods

Up to 300 cutting methods can be stored.

The default number: 10.

Wheel selection mode

Can be set to Intelligent or Manual
Default value: Intelligent

Manual:	the cut-off wheel is selected manually from the selection tree in the <i>Edit method</i> screen
Intelligent:	a cut-off wheel is automatically suggested based on the material (hardness) selected by user. The recommended RPM and thickness is automatically set.

Operation mode:

It is possible to select three different operation modes:

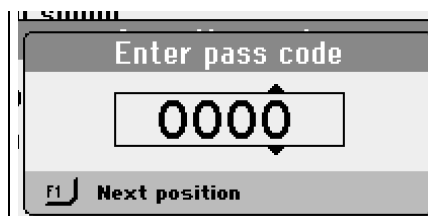
Configuration:	Full functionality
Development:	No access to parameters in CONFIGURATION menu, except Display contrast
Production:	Access to START, STOP, <i>Stop position</i> and movement of cut-off wheel, and to Display contrast in the CONFIGURATION menu

Changing Operation Mode

To change the operation mode, go to the *Configuration* menu and then the *Options* menu. Select **Operation mode** to access the *Operation mode* menu.

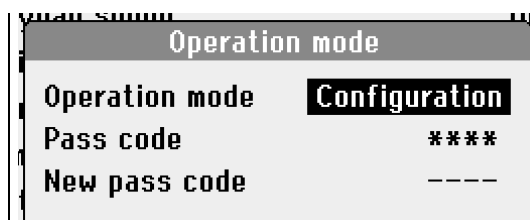


Push knob to select Pass code.



Use the F1 key and the knob to enter the current pass code (The default pass code is '2750'.):

- Use the F1 key to select digits.
- Turn knob to change the digits and press knob to enter the pass code.





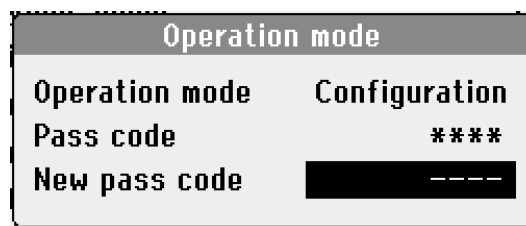
Push knob to select **Configuration**.



Select the desired operation mode and push knob to confirm.

New Pass Code

A New pass code can also be selected from the *Operation mode* menu.



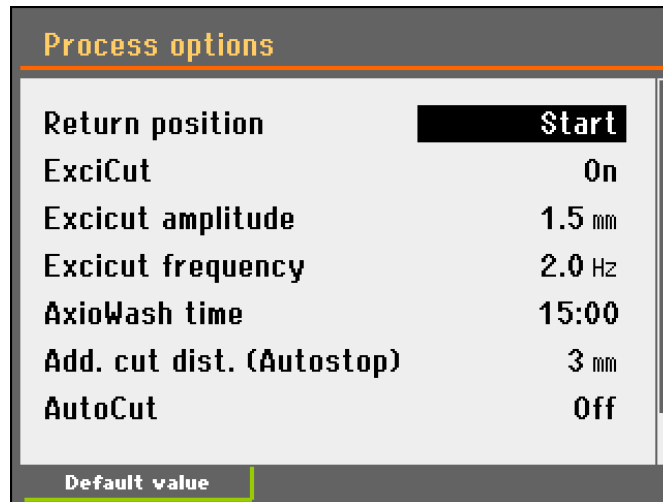
NOTE:

When a pass code is set the operator has 5 attempts to enter the correct pass code after which the Magnutom will be locked. Re-start Magnutom using the Main Switch then enter the correct Pass Code.

NOTE:

Remember to make a note of the new Pass code as settings can no longer be changed without the Pass code.

Process options menu



Return position:

After cutting or after pressing STOP ⏏, the return movement of the cut-off wheel can be set to three different functions:

<i>Start:</i>	Magnutom automatically retracts the cut-off wheel to the original position of the cut-off wheel, at the time you pressed START ⏏ (default).
<i>Zero:</i>	Magnutom automatically retracts the cut-off wheel to the rear of the chamber (cutting mode Y) or move up in the chamber (cutting modes Z, ZY, AxioCut).
<i>Stay:</i>	The cut-off wheel stays in position after the cut is completed.
<i>Top & Rear:</i>	Magnutom automatically retracts the cut-off wheel to the rear of the chamber and to its top position.



NOTE:

Use the *Stay* function for bakelite bonded diamond or CBN cut-off wheels, as retraction might destroy the rim of the cut-off wheel.

NOTE:

When using MultiCut the *Stay* function cannot be used. With MultiCut 4, *Zero* position will automatically be used.

ExciCut

ExciCut cutting action

Setting	Default value
On or Off	On

Both the **amplitude** and the **frequency** of the ExciCut action can be tailored to provide optimal cutting of specific workpieces:

ExciCut amplitude

Range	Default value
0.5 – 4mm in steps of 0.5	1.5 mm

ExciCut frequency

Range	Default value
0.2 – 2.5Hz, in steps of 0.1 Hz	0.5 Hz



HINT:

Change the amplitude and frequency values gradually and in small steps; the ExciCut action is very powerful and making larger adjustments in the values may result in damage to the workpiece or the cut-off wheel.

For further details on the *ExciCut cutting action*, see the section on [Cutting actions](#).

AxioWash time

Range	Default value
0.30 – 30:00 in steps of 0.30 mins	15 mins

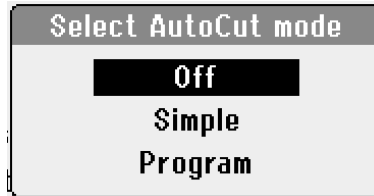
*Additional Cutting Distance
(AutoStop)*

An additional distance can be set to ensure that the workpiece is completely cut through when the *AutoStop* is selected.

Range	Default value
0 – 20 mm, in steps of 1 mm	2 mm

AutoCut

Can be set to Off, Simple or Program.
Default value – Off



- Off:** The operator moves the cut-off wheel towards the workpiece before START is pressed.
- Simple:** The cut-off wheel will automatically move towards the workpiece at a maximum speed of 5mm/s when START is pressed.
After contact with the workpiece, the cut-off wheel is automatically retracted 2 mm, to be ready for cutting. The cut-off wheel will then continue to move down into the workpiece at the pre-set Feed speed.
- Program:** When AutoCut is set to Program, the *Edit method* menu will change to indicate that a programmed **AutoCut position** is set.

When an AutoCut position is set:
The cut-off wheel will advance at high speed to the pre-programmed start position when START is pressed.
After reaching this position the speed is reduced until contact is made with the workpiece.
After contact with the workpiece, the cut-off wheel is automatically retracted 2 mm, to be ready for cutting. The cut-off wheel will then continue to move into the workpiece at the pre-set Feed speed.

The main purpose of AutoCut is for cutting of large/long workpieces where the cutting arm preferably should be at the far back while loading. The programmable Return Position is set to Top & Rear for maximum access. In order to make the cut as quickly as possible, the start position (just ahead of the workpiece) can be set using AutoCut Program.

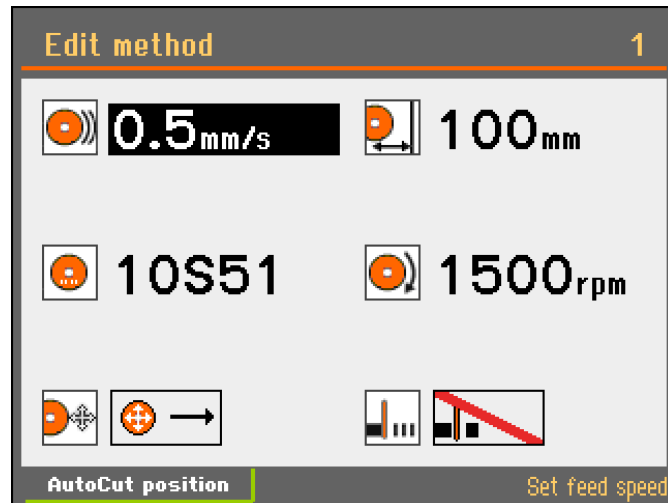


NOTE:

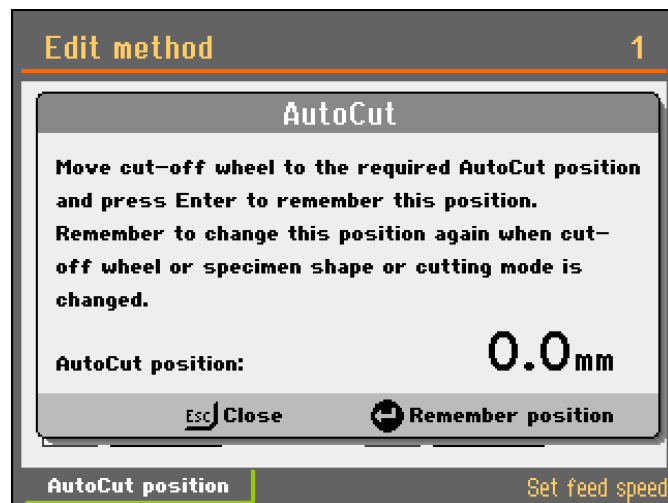
AutoCut is automatically set to Off whilst using MultiCut, to avoid damage to the cut-off wheel and workpiece.

Setting an AutoCut position:

From the *Edit method* menu



- F1 Press the F1 key.
The *AutoCut* pop-up screen will appear (note: AutoCut must be set to Program from the Process options menu)



Use the Joystick to move the cut-off wheel to the required AutoCut start position.

- ESC Press **Esc** to leave the menu without changing the AutoCut start position.

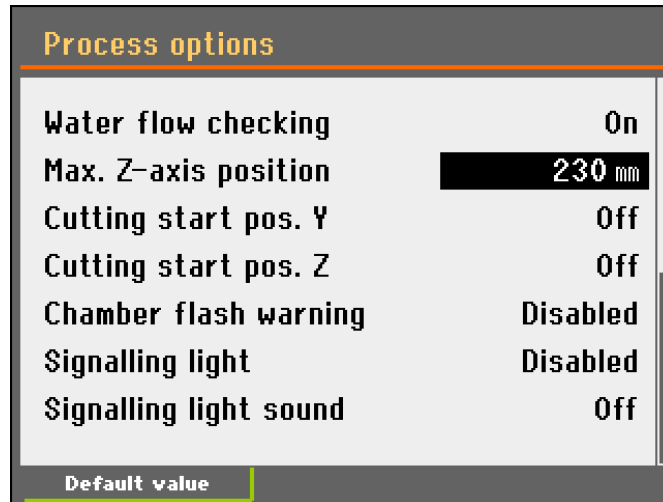


Push knob to set the AutoCut start position to the present position of the cut-off wheel.



NOTE:

AutoCut position is set for the current cutting mode selected. If cutting mode is then changed, the AutoCut position is automatically reset to zero (for safety reasons). When AutoCut position is set to 0.0mm, AutoCut Program will function in the same way as AutoCut Simple.



Water flow checking

Can be set to On or Off
Default value - On

When Water flow checking is set to On, the flow of cooling liquid is checked at the start of and during a cutting process. If the water flow is below a set value, then the cutting process will be stopped. Water flow checking Off can be used to continue operating Magnutom if the water flow is adequate but the flow sensor is not measuring correctly.

Max. Z-axis position

Can be set to Off or between 100 to 240 mm
Default value – 240 mm

This can be used to limit the Z movement of the cutting arm. This function is useful when using special clamping devices or workpieces with irregular geometries.

To set a *Max. Z-axis position*:

- Mount the clamping tool.
- Use the joystick to position the cutting arm in the maximum Z position.
- Read the **Abs. Z**-value from Positioning screen and change the *Max. Z-axis position* in the Process options menu to this value.

Cutting start pos. Y

Setting	Default value
Off or 0 to 385 mm	Off

Cutting start pos. Z

Setting	Default value
Off or 0 to 230 cm	Off



Tip:

Setting the Cutting start position is useful when cutting workpieces of the same size. When Start is pressed, the cut-off wheel will quickly move to the set position.

Chamber flash warning

Setting	Default value
On or Off	Off

Signalling light

Setting	Default value
On or Off	Off

Signalling light sound

Setting	Default value
On or Off	Off

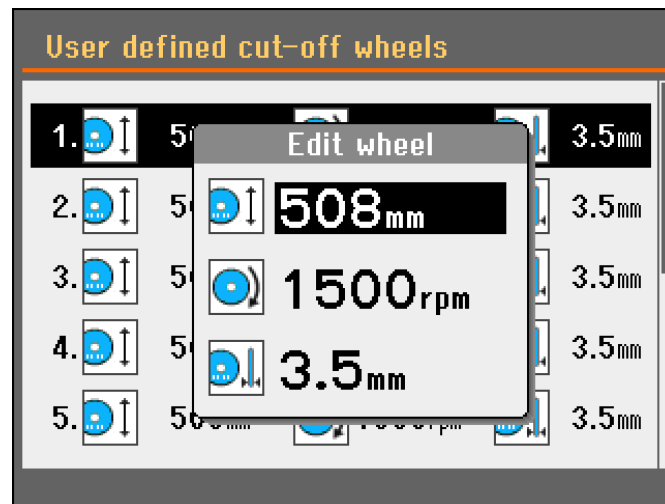


Information:

Please refer to the section on [Signalling light](#) (option) on page 25 for details.

User defined cut-off wheels menu

Up to 10 user cut-off wheels can be defined for use on Magnutom. The parameters for the wheel size, rotational speed and width can be set using the *Edit wheel* menu.



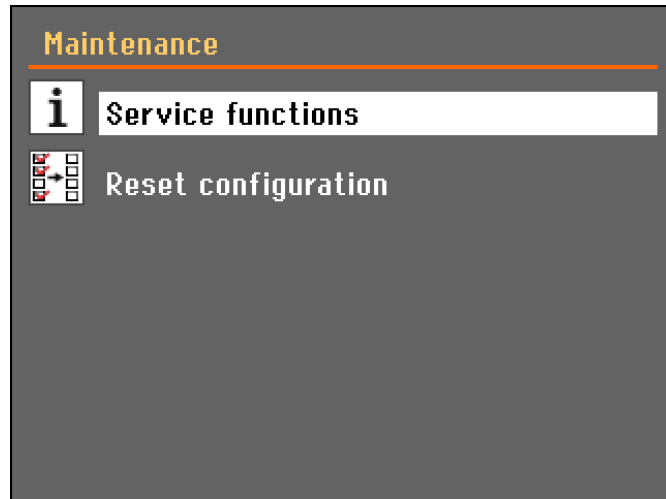
Parameters

	Range	Default value
Size	300 – 508 mm	508 mm
RPM	1000 – 1850 rpm (Magnutom-500) 1000 – 1950 rpm (Magnutom-400)	1500 rpm
Width	1.0 – 6.0 mm	3.5 mm

Maintenance menu

The *Maintenance* menu has 2 under menus

- Service functions
- Reset configuration



Service functions

Service information and statistics can be viewed in the **Service functions** menu.

Basic service functions can also be carried out.



NOTE:

The Service functions menus are in English only. Using the same names/ terms is useful when communicating with your local Service Technician or Struers Customer Service department.

Reset configuration

Magnutoms user and process options can be set to default values by selecting **Reset configuration**. (The cutting methods and cut-off wheel database will be unaffected).

Cutting Actions *ExciCut*

ExciCut cutting action is ideal for fast cutting of very hard materials (HV >400). The oscillating movement of the cut-off wheel has two main advantages: there is less risk of damage to the workpiece and less risk of the motor overheating.

ExciCut is also recommended when cutting softer, non-hardened materials

ExciCut cutting action is selected as default for each Cutting mode.

The function can be disabled in the Configuration menu.

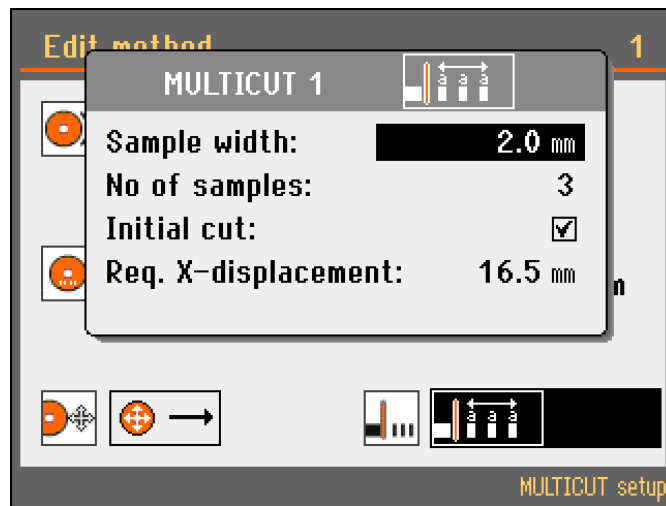
Sampling methods

Magnutom's five sampling methods are: Single Cut (MultiCut Off), MultiCut 1, MultiCut 2, MultiCut 3 and MultiCut 4. (MultiCut can only be selected when an optional X-table is fitted.)

MultiCut 1



MultiCut 1 permits the cutting of several samples of equal width. To set up cutting using MultiCut 1 mode:



Sample width

This parameter sets the width of the samples that will be cut.

No. of samples

This parameter sets the number of samples that will be cut.

Initial cut

Select this parameter if you need to make an initial cut, before you start cutting the samples that you need. This cuts a scrap sample, which you will not use. For example, if the workpiece has an uneven edge that would make it unsuitable as a first sample.

Required X-displacement

This parameter is calculated by the Magnutom to tell you the length of the X-displacement needed to cut your samples, based on the parameter settings.



NOTE:

Sample width + Thickness of cut-off wheel x No. of samples.

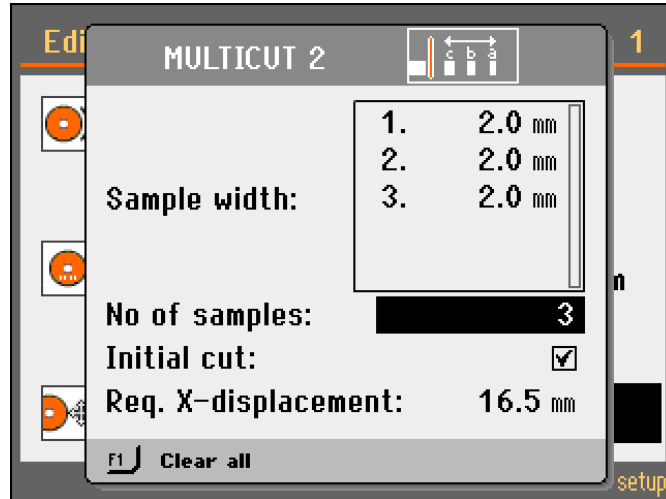
Initial cut: ☒	=	(Sample width + Thickness of cut-off wheel) x (No. of samples + 1)
Required X-displacement		
Initial cut: ☐	=	(Sample width + Thickness of cut-off wheel) x (No. of samples)
Required X-displacement		

MultiCut 2



MultiCut 2 permits the cutting of several samples of different widths.

To set up cutting using MultiCut 2 mode:



Sample width

This parameter sets the width of the samples that will be cut.

Initial cut

Select this parameter if you need to make an initial cut, before you start cutting the samples that you need. This cuts a scrap sample, which you will not use. For example, if the workpiece has an uneven edge that would make it unsuitable as a first sample.

No. of samples

This parameter indicates the number of samples that will be cut.



NOTE:

Pressing the F1 key in this menu will clear all of the samples and their values.

Required X-displacement

This parameter is calculated by the Magnutom to tell you the length of the X-displacement needed to cut your samples, based on the parameter settings.

For samples 1 to n:

$$\begin{aligned} \text{Required X-displacement} &= (\text{Sample width 1} + \text{Thickness of cut-off wheel}) \\ &+ (\text{Sample width 2} + \text{Thickness of cut-off wheel}) \\ &+ \dots \dots \dots \\ &+ (\text{Sample width n} + \text{Thickness of cut-off wheel}) \end{aligned}$$

MultiCut 3



MultiCut 3 permits the cutting of several samples of different widths at different relative distances from the 'zero', or starting position. The distances are manually entered into the Magnutom.

To set up cutting using MultiCut 3 mode:



Cutting position

This parameter sets the position of the cuts. The values show the relative distance to the zero position.

Cut at zero position

Select this parameter to make an initial cut at zero position. Otherwise Magnutom will immediately move to the position for sample 1 and start cutting at that position.

No. of samples

This parameter indicates the number of samples that will be cut.



NOTE:

Pressing the F1 key in this menu will clear all of the samples and their values and return the menu to its default.

Required X-displacement

This parameter is calculated by the Magnutom to tell you the length of the X-displacement needed to cut your samples, based on the parameter settings.

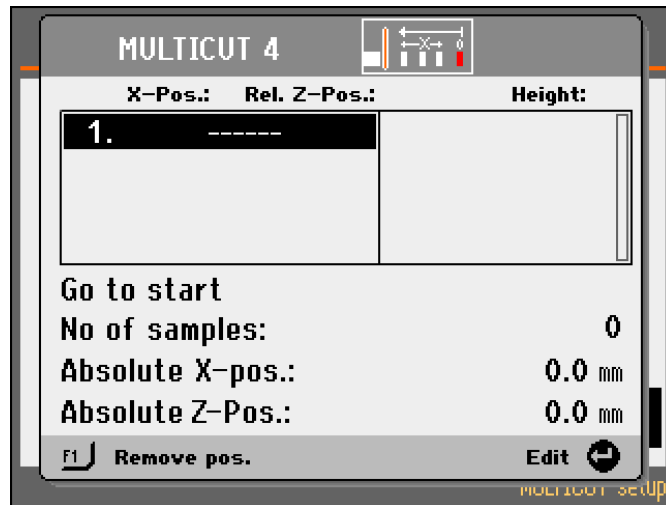
Required X-displacement = The last relative cutting position entered

MultiCut 4



MultiCut 4 permits the cutting of several samples of different widths at different relative distances from the 'zero', or starting position. The distances are entered into the Magnutom by using the X-table to position the workpiece under the cut-off wheel where the sample is to be cut and then recording this position. Cut-off wheel position is also recorded so different starting-height positions are possible.

To set up cutting using MultiCut 4 mode:



Setting the cutting parameters

- Use the joystick to move the X-table to the position where the first cut is to be made.
- Position the cut-off wheel about 2 mm above the workpiece.
- Press the knob to insert the current position as the cutting position.
- Repeat the steps to insert the cutting positions for all samples.

X-pos.: Y-pos.
or
X-pos.: Z-pos.

The different cutting positions of both the X-table and the cut-off wheel . Y or Z position (depending on which cutting mode is selected).

X-pos.: Y-pos.: cutting mode Y

X-pos.: Z-pos.: cutting modes Z, ZY, AxioCut

Go to start

This key moves the X-table until the cut-off wheel is in the start position.

No. of samples

This parameter indicates the number of cuts that will be made.

Absolute Y-pos. /
Absolute Z-pos.

The current Y or Z position of the cut-off wheel (depending on which cutting mode is selected).

Absolute Y-pos.: cutting mode Y

Absolute Z-pos.: cutting modes Z, ZY, AxioCut



NOTE:

Pressing the F1 key in this menu will clear all of the samples and their values.

NOTE:

When MultiCut 4 is selected and F1 is pressed, Stop position is also set to *Auto*.

Stop position can be changed to a specific position. However, this position is defined from the position of the cut-off wheel at the first cutting position. If the cut-off wheel is in a different starting position for the following cuts, the cut length will remain the same as for the first cut and will be more or less than the cut length required. . *Auto* setting is therefore recommended.

Example for Z cutting mode:

MULTICUT 4			
	X-Pos.:	Rel. Z-Pos.:	Height:
1.	0.0 mm	0.0 mm	100 mm
2.	22.4 mm	16.0 mm	90 mm
3.	47.8 mm	28.0 mm	105 mm
4.	75.0 mm	10.0 mm	80 mm
Go to start			
No of samples:			4
Absolute X-pos.:			75.0 mm
Absolute Z-Pos.:			10.0 mm
F1 Remove pos.			Edit

AutoCut: Off

After each cut the cutting arm will:

- Move to top position (to ensure there is no collision with the workpiece during movement in the X direction).
- Then move to the set X position.
- Move quickly to the predefined cut-off wheel position.
- Starts cutting with the predefined Feed speed.

AutoCut: Simple or Program

After each cut the cutting arm will:

- Move to top position (to ensure there is no collision with the workpiece during movement in the X direction).
- Then move to the set X position.
- Move quickly to the predefined cut-off wheel position then search for workpiece with relatively high speed.
- Starts cutting with the predefined Feed speed.

Changing the Cut-off Wheels During MultiCut

When cutting several specimens it may be necessary to change the cut-off wheel during a MultiCut program.

- Press STOP ⏏ to manually interrupt the cutting process.
The cut-off wheel arm goes to the start position.
- Change the cut-off wheel.
- Position the cut-off wheel approximately 1- 2mm above the workpiece.



NOTE:

Do NOT move the cut-off wheel back to its position immediately before STOP was pressed.
When START is pressed, Magnutom registers this as a new start position and will return to this position after the cut is finished. The cut-off wheel will be damaged if it is still inside the workpiece when the X-table moves to the next cut position.

- Press START ⏏ to resume cutting.
- A Pop-up will appear:
Press Enter to continue with the programmed MultiCut batch.



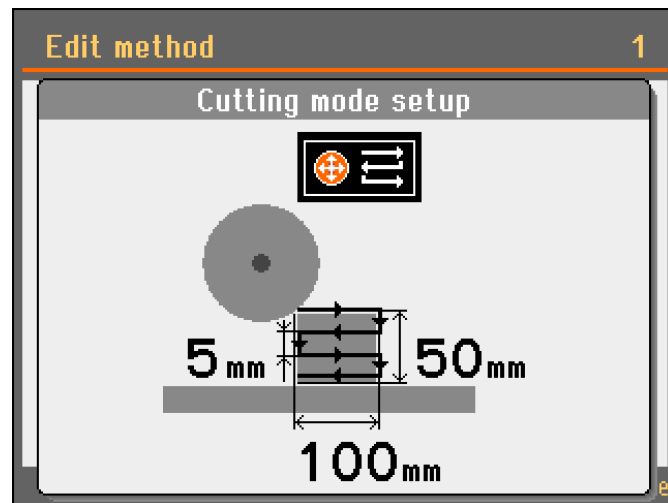
NOTE:

The cut-off wheel will start rotation and move towards the workpiece.
If desired, the process can be sped up by using the joystick (feed speed will be 3 times the preset feed speed).

AxioCut cutting mode



AxioCut cutting mode offers cutting of large and very hard materials. The vertical cut length and height of the workpiece can be set as well as the depth of each downwards step (in the example below, set to 5 mm).



When in AxioCut cutting mode, the vertical feed speed is the same as the horizontal feed speed.



NOTE:

AxioCut does not function when AutoCut is selected.
In practice, AxioCut cutting mode should not be used with MultiCut.

Stop Settings



AutoStop

There are two ways to set the stop position: Setting a Cut length or *AutoStop*.

When the *AutoStop* function is selected, the machine automatically stops when the workpiece has been cut through. *AutoStop* is based on changes in the cutting motor load where a decrease in load indicates that the workpiece has been cut through.

However, Magnutom has a very powerful motor so small changes in the load may not be detected. As a result the *AutoStop* function may not detect when the workpiece has been cut through. This may particularly be the case when cutting soft materials, smaller workpieces, pipes or workpieces with changing cross-section or when cutting at low Feed Speeds.

If *AutoStop* does not work properly use the *Stop position* function instead or set an Additional Cutting Distance to compensate.

Additional Cutting Distance (AutoStop)

An additional distance can be set to ensure that the workpiece is completely cut through when the *AutoStop* function is used. This is important when using the MultiCut option.

An Additional cutting distance is set in the *Process options* menu.



NOTE:

When *AutoStop* is selected, a countdown timer will not be displayed.

Cut length

Cut length is used when a specific stop position is desired. When cutting pipes or other workpieces with changing cross sections, the cut-off wheel may retract before the workpiece has been cut through. To overcome this, a specific Cut length can be set.

- Clamp the workpiece and position the cut-off wheel just above the workpiece.

This position is automatically set to 0 (zero). Accordingly, as soon as Start has been pressed, the actual position of the cut-off wheel, becomes a relative starting point (zero), from where the cutting depth is calculated.

- Select the STOP parameter and set the desired stop position using the knob.

Magnutom will now stop when it reaches the pre-set stop position.

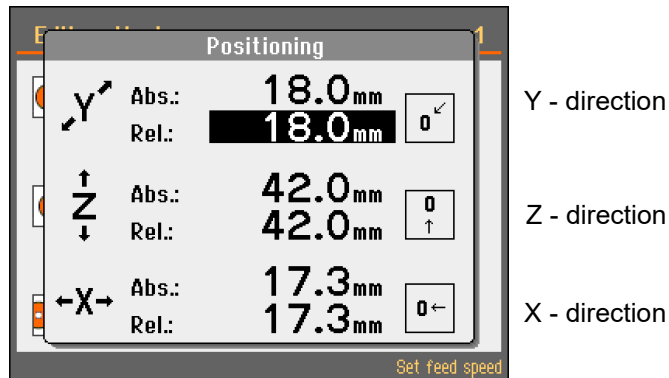
Remember to take the wear of the cut-off wheel into consideration.

Positioning Screen

The *Positioning* screen shows the Y and Z positions of the cutting arm and the X position of the X-table (with x-table option). The screen is displayed for 3 seconds when the joystick has been activated.

- To keep the screen displayed (for up to 15 minutes), press the **F1** key.
- To close the screen, press **ESC**.

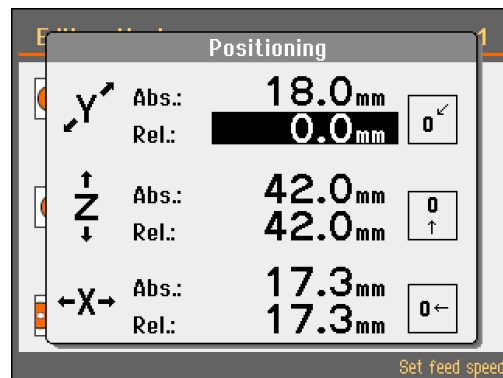
Absolute and Relative positions usually have the same value, but the user can define a new relative position, e.g. if there is a specific point on the workpiece that the user wants to set as 'zero position'.



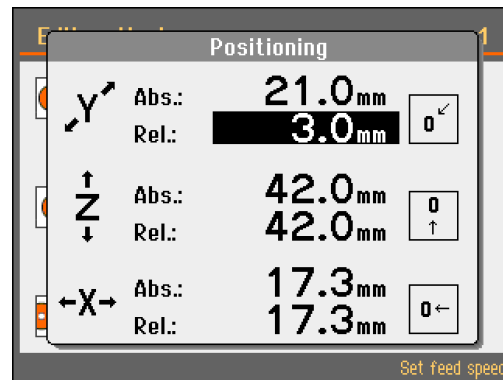
Setting a Relative Zero Position

To define a new relative zero position:

- Move the cursor to the rel.: position, then press **Enter**. This position (in the current example, Y position 18.0 mm) is now set as the new relative zero.

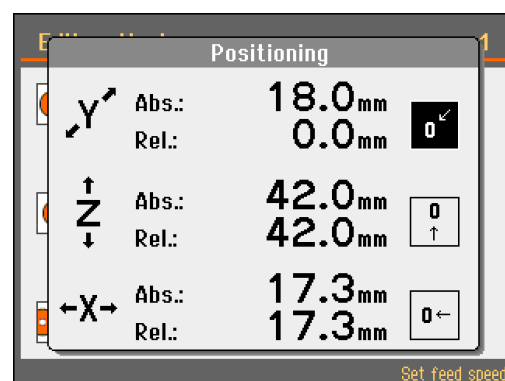
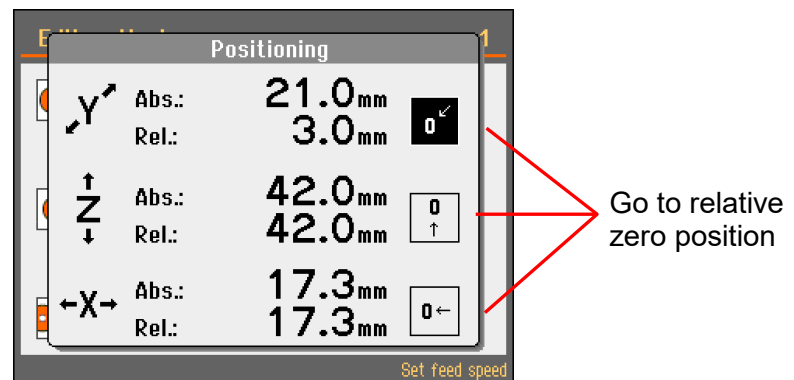


When the cutting arm is moved, the relative position now shows the value in regard to the previously defined zero position.



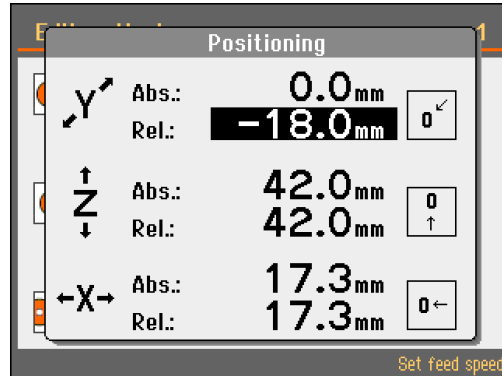
To return to the previously defined zero position:

- Move the cursor to the “Go to relative zero position” icon and press **Enter**.

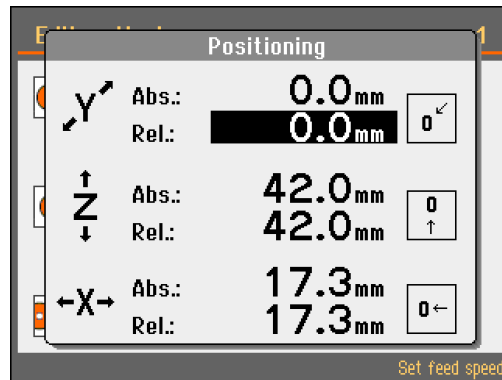


Removing a Relative Zero Position

- Move the cutting arm to *abs.:* zero position (0.0 mm).



- With the cursor highlighting the *rel.:* position, press **Enter**.



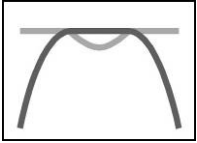
Reference Positions

Magnutom will perform a search for reference positions for every 20th start up.

To perform an additional reference search:

- Switch Magnutom off.
- Press the Emergency STOP then switch Magnutom on (a message will appear to inform that the Emergency STOP is activated).
- Release the Emergency STOP and a pop-up will appear. Press Enter to start the search for reference positions.

OptiFeed function

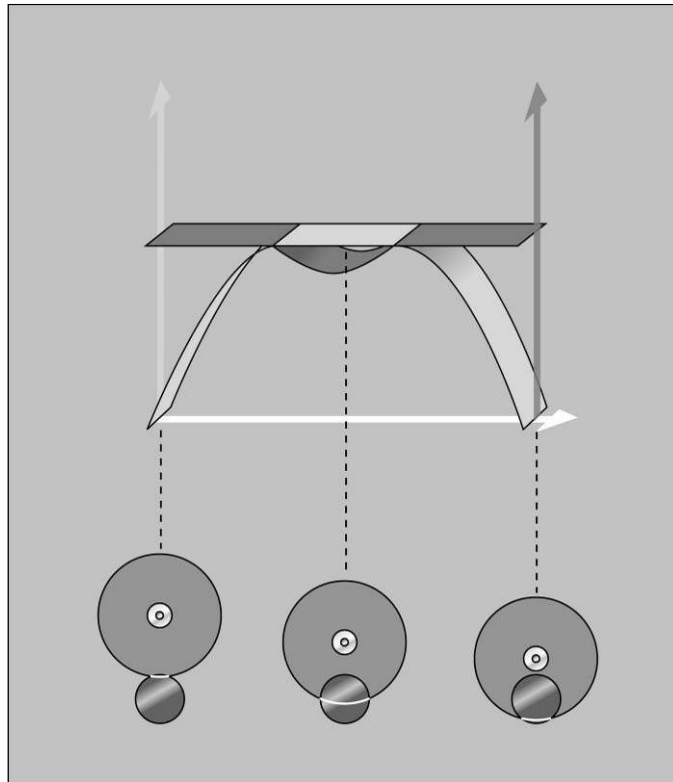


During cutting, Magnutom continuously measures the load on the cutting motor and force in the cutting arm.

The factors that determine the load are the shape and properties of the workpiece.

The OptiFeed function:- Whenever the maximum force or motor load is reached (150%), Magnutom will automatically reduce the Feed speed. As soon as the force or load drops below the set limit, the speed will be increased to the original setting.

The figure below illustrates the increase in force as the cut-off wheel gets closer to the centre of a round workpiece.



Clamping Irregular Workpieces

Irregular workpieces without plane clamping surfaces must be clamped using special clamping tools, as the workpieces must not move during cutting. This could result in damage to the cut-off wheel or to the sample itself. Use the T-slots to mount the special clamping tools. Struers offers a large selection of Clamping Tools (See Accessories).

To achieve faster cutting, position the workpiece so that the wheel will cut the smallest possible cross-section.

Removing the left cutting table
(models with fixed cutting table)

If required, the left side of the cutting table can be removed to make room for very large or irregular workpieces.

Safety Features

Doors

The doors are equipped with a safety switch to prevent the cut-off wheel from starting while the doors are open. Furthermore, a locking mechanism prevents opening of the doors before the cut-off wheel has come to a complete stop.

The doors can only be opened when the machine is connected to a power supply and the main power switch is ON.
To open the doors when the power is not connected, use the triangle key to release the safety lock.
Remember to re-activate the safety lock release before operating Magnutom.

The PETG safety glass in the windows are designed to withstand flying fragments of cut-off wheel or samples. A sticker on the window indicates when the glass should be replaced. Replace immediately if the window is damaged or cracked.

Hold-and-run operation

When moving the cut-off wheel whilst the doors are open, the Hold-to-run button on the front of Magnutom must be pressed and held immediately before the joystick is operated.

Motor overload

The motors of Magnutom are protected against overload. Should the motors overheat and/or overload, the motors will disengage until a normal temperature has been obtained.

Lockable Main Switch

When the main switch is turned Off, a hole in the lock's housing can be used to attach a padlock or a plastic strip.
This is particularly useful during Servicing as it will prevent Magnutom from being switched on before the Service is complete.

Optimising Cutting Results

The following table shows possible answers to a number of common questions:

Optimising the Cutting Results	
Question	Answer
How can I avoid discoloration or burning of the sample?	Use a lower Feed Speed.
	Change the cut-off wheel as the hardness of the present cut-off wheel may be inappropriate for the hardness of the sample. *)
How can I avoid burrs?	Use a softer cut-off wheel. *)
	Clamp the workpiece securely at the right hand clamping device. Tighten the left hand clamping device just enough to prevent the workpiece from moving when being cut.
How can I avoid the cut-off wheels wearing too quickly?	Use a lower Feed Speed, a different cutting mode or a harder cut-off wheel. *)
How can I achieve faster cutting?	Position the workpiece so as to cut the smallest possible cross-section. Use a high Feed Speed.

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

2.Struers Knowledge

Materialographic sectioning is where most microstructure analysis begins. A good understanding of the abrasive 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.

3. Accessories and Consumables

Accessories

Please refer to the [Magnutom brochure](#) for details of the range available.

Clamping Tools

Please refer to the [Struers Clamping Tools brochure](#) for details of the range available.

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 and tubes), where the damage can be directly related to the use of non-Struers consumables.*

Cut-off Wheels

When Wheel selection mode is set to Intelligent, a cut-off wheel is automatically suggested based on the material (hardness) selected by the user.

Material guide	
Material:	Non-ferrous, soft metals HV 30-300
Diameter:	432 mm
Wheel:	10S43

Alternatively, please refer to the Selection Guide in the [Struers Cut-off Wheels brochure](#).

Other Consumables

Specification	Cat no.
Corrozip Additive for Cooling Fluid To protect the machine from corrosion and to improve cutting and cooling qualities.	
1 l	49900045
5 l	49900046
Grease for maintenance/lubrication of the spindle	16080802
Oil for maintenance of cutting table	16080845

4. Trouble-Shooting

Error	Explanation	Action
Machine Problems		
Water leaking.	Leak in recirculation water hose.	Check the hose and tighten the hose clamp.
	Water overflow in the Cooling fluid tank.	Remove the excess cooling fluid from the tank.
Samples or cutting chamber corroded.	Insufficient additive for cooling fluid.	Add Struers Additive for cooling fluid to the cooling fluid, using the correct concentration. Check with a refractometer. Follow the instructions in the Maintenance section.
	The machine is left with closed protection doors.	Leave the doors open to let the cutting chamber dry.
Quick-clamping device unable to hold the workpiece.	The quick-clamping device is not in balance.	Adjust the screw underneath the clamping column. Use a 3mm Allen key.
	Clamping heart worn.	Call a Struers Service Technician.
Door will not close	There is an obstruction in the cutting chamber.	Remove the obstruction.
Machine is locked	Incorrect Pass Code used.	Re-start machine using Main Switch. Enter the correct Pass Code. If error remains, contact a Struers Service Technician.

Error	Explanation	Action
Cutting Problems		
Discoloration or burning of the sample.	The hardness of the cut-off wheel is inappropriate for the hardness / dimensions of the sample.	See Consumables section, Cut-off Wheels.
	Inadequate cooling.	Check that there is enough water in the recirculation cooling unit. Check the condition of the cooling tray.
	Feed Speed or RPM too high.	Reduce the Feed Speed or reduce the RPM.
Unwanted burrs.	Wheel too hard.	Reduce RPM to make wheel softer, or change to different wheel: See Consumables section, Cut-off Wheels.
	Insufficient support of workpiece.	Add further support to the workpiece.
The cutting quality differs.	Cooling liquid hose clogged.	Clean the cooling liquid hose and the cooling tubes. Check the water flow by turning the cooling valve to cleaning position.
	Insufficient cooling liquid.	Refill tank with water. Remember to add Struers Additive.
The cut bends to one side.	Feed Speed is too high.	Reduce the Feed Speed.
The cut-off wheel breaks.	Incorrect mounting of the cut-off wheel.	Check that the centre-hole has the correct diameter. Check cardboard washer on both sides of the cut-off wheel. The nut must be tightened properly.
	Incorrect clamping of the workpiece.	Make sure that only one of the quick-clamping devices is tight. The other device should only press lightly. Use support tools if the geometry of the workpiece makes support necessary.
	Wheel too hard.	See Consumables section, Cut-off Wheels.
	Feed Speed too high.	Reduce the Feed Speed.
	Inadequate cooling.	Check that there is enough water in the recirculation cooling unit. Check the cooling liquid hoses.
The cut-off wheel wears down too quickly.	Feed Speed too high.	Reduce the Feed Speed.
	Insufficient cooling.	Check that there is enough water in the recirculation cooling unit. Check the cooling liquid hoses.
	The cut-off wheel is too soft for the task.	See Consumables section, Cut-off Wheels.
	Magnutom vibrates (worn bearings).	Call a Struers Service Technician.

Magnutom-400/-500
Instruction Manual

Error	Explanation	Action
The cut-off wheel does not cut through the sample.	Incorrect choice of cut-off wheel.	See Consumables section, Cut-off Wheels.
	Cut-off wheel worn.	Replace the cut-off wheel.
	The cut-off wheel gets caught in the workpiece.	Support the workpiece and clamp it on both sides of the cut-off wheel in such a way to allow the cut to stay open.
	Incorrect choice of Cutting Mode. AxioCut is intended for large workpieces.	See section on Operation, Cutting Mode.
The workpiece breaks when clamped.	The workpiece is brittle.	Place the workpiece between two polystyrene plates. NB! Always cut brittle workpieces very carefully.
The sample is corroded.	The sample is not resistant to water.	Use a neutral liquid as cooling fluid or cut without using cooling fluid at all. DO NOT USE AN INFLAMMABLE LIQUID
	The sample has been left in the cutting chamber for too long.	Leave the doors open, when you leave the machine.
	Insufficient additive for cooling fluid.	Add Struers Additive for cooling fluid to the cooling liquid in the correct concentration. Check with a refractometer. See Maintenance section.
<i>AutoStop</i> does not stop the cutting action.	The cross-section of the workpiece is too small or irregular to detect a change in load.	Use the <i>Stop position</i> function.
AxioCut cutting mode is not working.	AxioCut does not function when AutoCut is selected.	Go to the <i>Process options</i> menu and set AutoCut to Off .

Error Messages

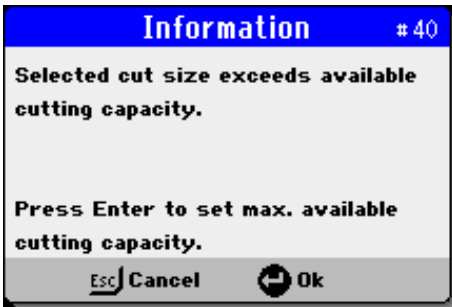
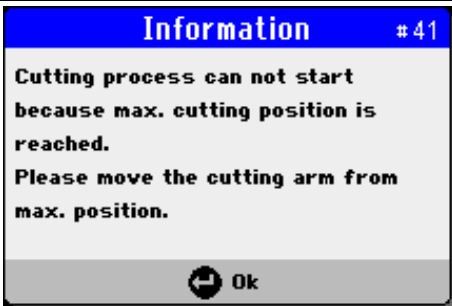
Error messages are divided into two classes:
Messages and Errors

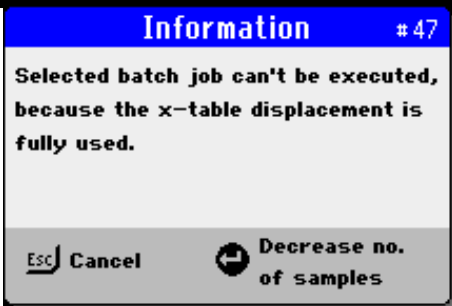
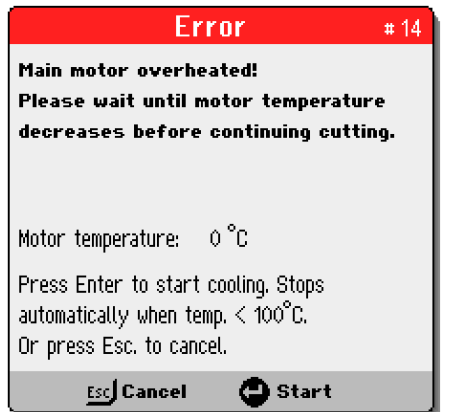
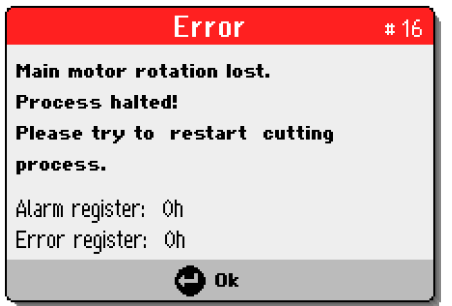
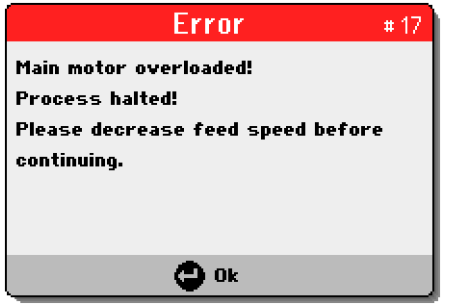
Messages

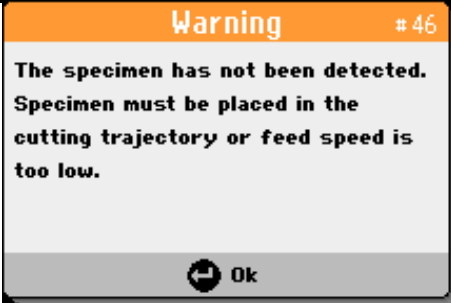
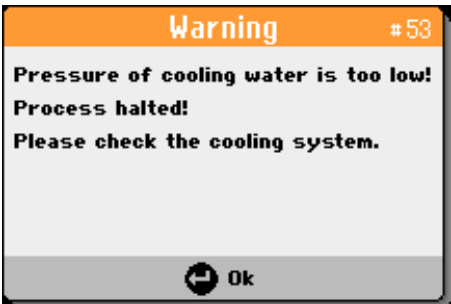
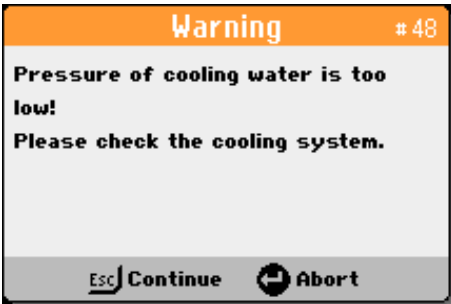
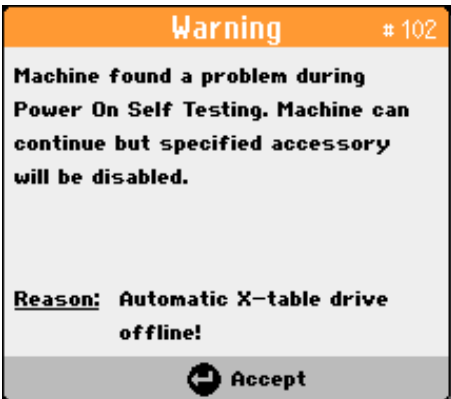
Messages are intended to inform the operator of the machine's progress and advise about minor operational errors.

Errors

Errors must be rectified before cutting can be continued.

Message	Explanation	Action
	#4	Move X-table to increase the distance between the positions.
	#5	Change to another Cutting Mode.
	#40	The selected cut size is not possible due to the current position of cut-off wheel. Press ENTER to set cut size to the maximum available or press Esc to return to the method.
	#41	The cutting arm is very close to the end position, therefore the cutting process cannot be started. Move the cutting arm from the end position and re-start the process.

Message		Explanation	Action
	#47	Multicut is activated but the current position of the X-table is not enough to make all the cuts.	Press ENTER to automatically decrease the number of cuts or press Esc to return to edit the method.
	#14	Motor temperature is > 150°C during start of process or Motor temperature is > 170°C during cutting process.	Press ENTER and wait until the motor has cooled.
	#16	Cutting motor has stopped rotating. A fluctuation may have occurred in the mains power supply.	Check the mains power supply then Re-start. If error remains, contact a Struers Service Technician.
	#17	Magnutoms OptiFeed feature automatically reduces feed speed if the load on the motor exceeds a set value. However, under some circumstances (e.g. initial feed speed too high or joystick movement activated during cutting) the Optifeed cannot decrease the feed speed fast enough and the motor current reaches a set limit.	Reduce the set feed speed before re-starting the cutting process.

Message	Explanation	Action
	#46 AutoCut is activated and the workpiece has not been detected during the cutting trajectory. Detection of workpiece is based on a change in the cutting motor current. The idle cutting motor current must increase by a set value upon contact with the workpiece. At low feed speeds, the difference between idle current and cutting current is very low so the workpiece is not detected.	Increase the feed speed and re-start the cutting process.
	#53 Water flow is too low at the beginning of a cutting process.	Press ENTER to abort the cutting process. Then check the cooling system. If error remains, contact a Struers Service Technician.
	#48 Water flow is too low at the beginning of a cutting process.	Press ENTER to abort the cutting process. Then check the cooling system. or The water sensor may be malfunctioning. Check if there is sufficient water flow, press Esc to continue with cutting process. If error remains, contact a Struers Service Technician.
	#102	Re-start. If error remains, contact a Struers Service Technician.

Message	Explanation	Action
Warning# 108 Force sensor signal is out of range. Collision with flange and detection of sample by cut-off wheel can not be provide. If problem persists contact Struers technical support. Ok	#108 Force sensor is not detected. Magnutom will operate without this sensor but some features, e.g. detection of workpiece will not function.	Re-start. If error remains, contact a Struers Service Technician.
Warning# 111 Force sensor is disabled! Detection of specimen and limitation of max. cutting force can not be provide. Ok	#111 The force sensor is disabled in the service menu. Magnutom will operate without this sensor but some features, e.g. detection of workpiece will not function.	Contact a Struers service technician to re-enable the force sensor.

Error		Explanation	Action
Error #23 Searching of reference position failed. Movement with cut-off wheel can be dangerous! Contact service technician if problem persists. Ok	#23	A problem has occurred during search for reference positions and the procedure has been interrupted. Attention!: Speed of cutting arm is reduced to enable some movement with the joystick but a cutting process cannot be started. Searching of reference position is required again after next switching on.	Press ENTER to acknowledge this message.
Error #24 Y-servo motor error detected during movement. Reason code: 0h Error status register: 1h Ok	#24	General Y-servo motor error detected during movement.	Press ENTER to clear this error inside servo motor to re-enable the movement. Re-start. If error remains, contact a Struers Service Technician. Please make a note of the <i>Reason code</i> and <i>Error status register</i> displayed on Magnutom.
Error #25 Z-servo motor error detected during movement. Reason code: 0h Error status register: 1h Ok	#25	General Z-servo motor error detected during movement.	Press ENTER to clear this error inside servo motor to re-enable the movement. Re-start. If error remains, contact a Struers Service Technician. Please make a note of the <i>Reason code</i> and <i>Error status register</i> displayed on Magnutom.
Error #35 X-table actuator error detected during movement. Please check and remove all potential obstacles from X trajectory. Ok	#35	An over current is detected during movement of the X-table. Usually due to an obstacle in the X-tables trajectory (e.g. sample is squeezed or the X-table is blocked).	Remove any obstacles then press ENTER to clear the error.

Error		Explanation	Action
Error #36 Excessive cutting force or collision with flange detected! Please decrease cutting speed or remove all potential obstacles from the trajectory. Ok	#36	Excessive force is detected during a cutting process. This can happen if flange or cut-off wheel guard collides with a cutting sample.	Remove any obstacles from cutting direction then press ENTER to clear the error.
Error #51 Excessive temperature detected in Y-servo motor. Error status register: 1h Ok	#51 #52	An over temperature ($> 73^{\circ}\text{C}$) is detected during movement with Y or Z servo motor.	Press ENTER to clear this error inside servo motor to re-enable the movement. Turn Magnutom off and allow the servo motor to cool down.
Error #52 Excessive temperature detected in Z-servo motor. Error status register: 1h Ok			

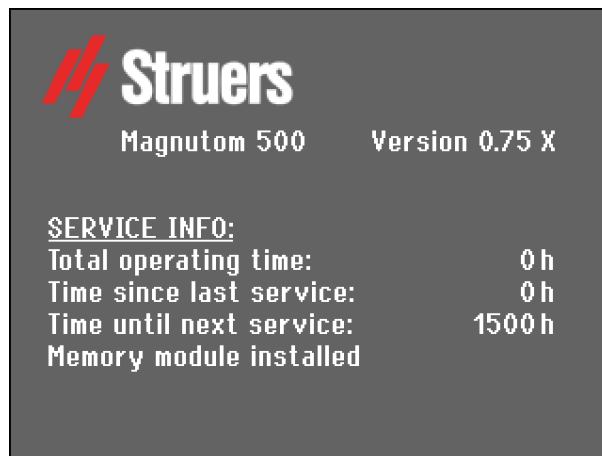
5. Service

Service Information

Struers recommends that a regular service check be carried out yearly (or after every 1,500 hours of use, if this is sooner). 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.

Information on total operation time and servicing of the machine is displayed on the screen at start-up:

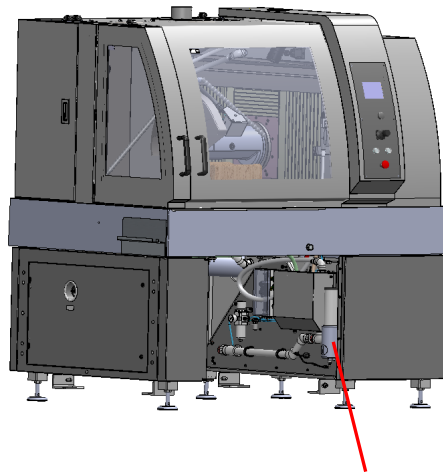


A pop-up message will alert the user that the recommended service interval has been exceeded.

Lubricating Moving Parts

Part of Struers ServiceGuard

Magnutom is equipped with an automatic lubrication system for the movement mechanisms.



Grease cartridge

The grease cartridge will need to be replaced after 1,500 hours of service.
Replacing the grease cartridge is part of the Struers **ServiceGuard** program.

6. Spare Parts and Diagrams

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

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



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.

Magnutom-400

Magnutom-400	Cat no:
Wheel Guard	16270330
Front PETG screen	16140572
Side PETG screen	16140556
Y,Z axis proximity sensor disk	16140981
Solenoid interlock AZM 161	2SS00120
Solenoid interlock actuator AZM 161	2SS01616
Magnetic sensor BNS120	2SS00130
Magnetic sensor actuator BP-10	2SS00131
Y,Z axis proximity sensors E2B	2HQ00030
Safety controller CPU module	2KS10030
Safety controller PSU module	2KS10031
Safety controller XTIO module	2KS10032
Speed monitor MOC3SA module	2KS10033
Frequency inverter V1000	2PU12050
STO module contactor J7KNA	2KM70900
Y, Z axis motor contactor J7KNG	2KM71411
X-table motor contactor J7KNG	2KM71411
Auxiliary relay PT	2KL10030
Hold-to-run button	2SA00400, 2SA41603, 2SB10072
Emergency stop button	2SA10400, 2SA41603, 2SB10071

Magnutom-500

Magnutom-500	Cat no:
Wheel Guard	16140330
Front PETG screen	16140572
Side PETG screen	16140556
Y,Z axis proximity sensor disk	16140981
Solenoid interlock AZM 161	2SS00120
Solenoid interlock actuator AZM 161	2SS01616
Magnetic sensor BNS120	2SS00130
Magnetic sensor actuator BP-10	2SS00131
Y,Z axis proximity sensors E2B	2HQ00030
Safety controller CPU module	2KS10030
Safety controller PSU module	2KS10031
Safety controller XTIO module	2KS10032
Speed monitor MOC3SA module	2KS10033
Frequency inverter V1000	2PU12050
STO module contactor J7KNA	2KM70900
Y, Z axis motor contactor J7KNG	2KM71411
X-table motor contactor J7KNG	2KM71411
Auxiliary relay PT	2KL10030
Hold-to-run button	2SA00400, 2SA41603, 2SB10072
Emergency stop button	2SA10400, 2SA41603, 2SB10071



Information:

SRP/CS (Safety-related parts of a Control System). Parts that have an influence on safe operation of the machine.



WARNING

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

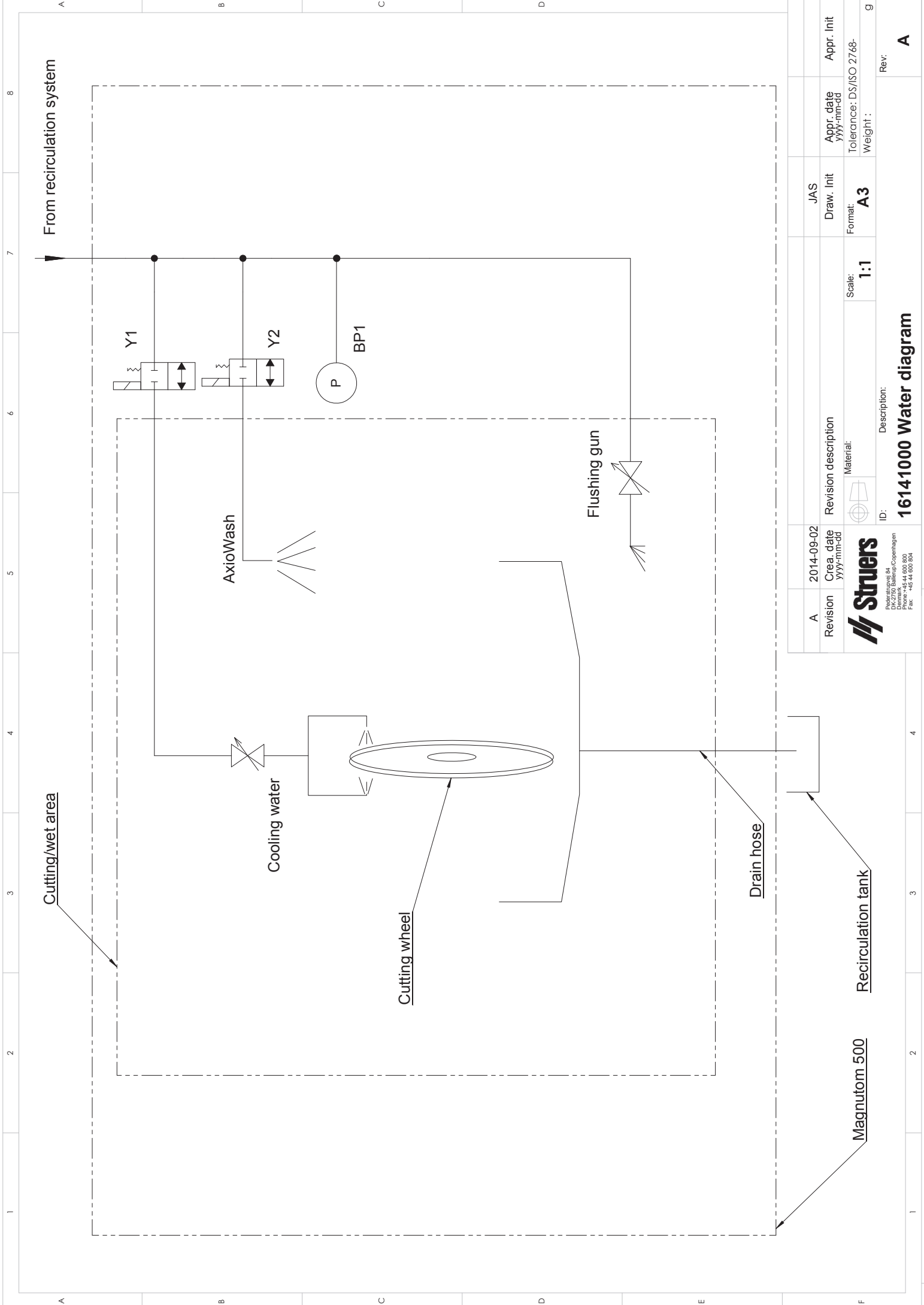


NOTE:

The PETG screen must be replaced after a lifetime of 5 years.

Diagrams

Water diagram Magnutom-500	16141000
Air diagram Magnutom-500	16141001
Circuit Diagram (9 pages)	16143100



A		2014-09-02	Revision description		JAS	Appr. date yyyy-mm-dd		Appr. Init		
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			ID:		Description:		Rev:		A	



Revisionsnr 84

Revisionsdato 2014-09-02

Dokumentnr 16141000-000

Dokumentnr 16141000-000

F30K +35 44 600 804

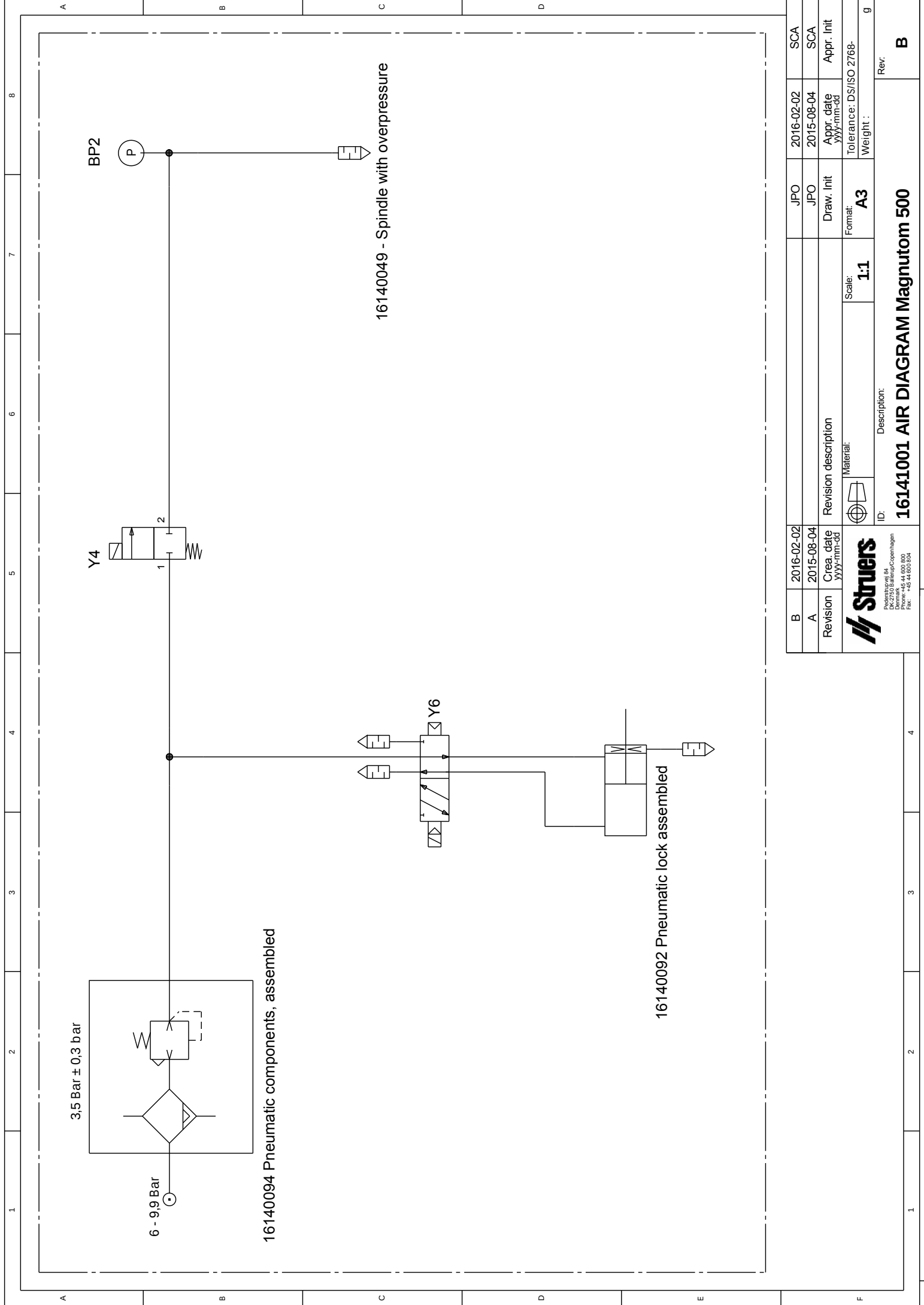
16141000 Water diagram



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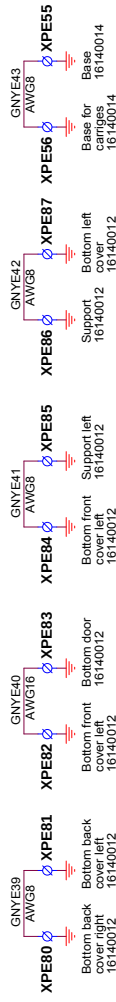
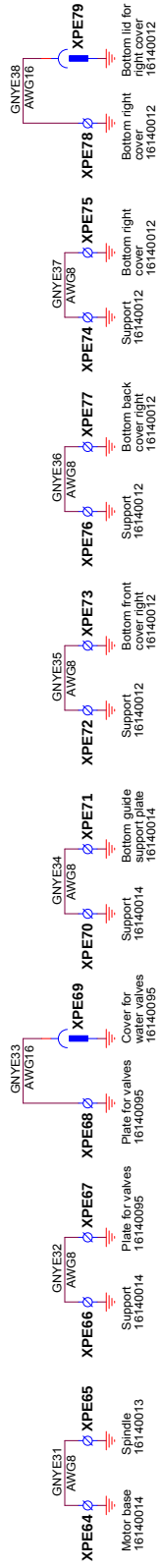
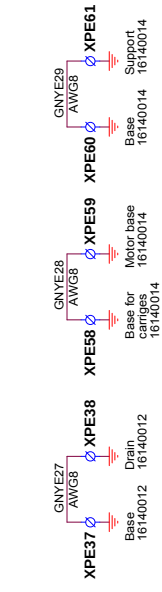
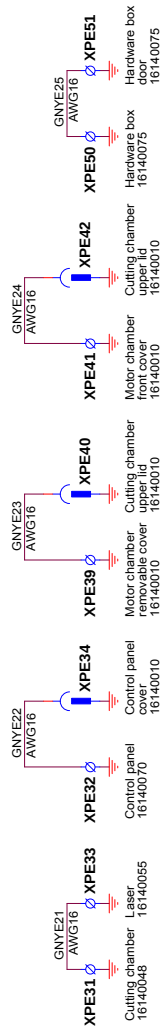
Recirculation tank

Magnum 500



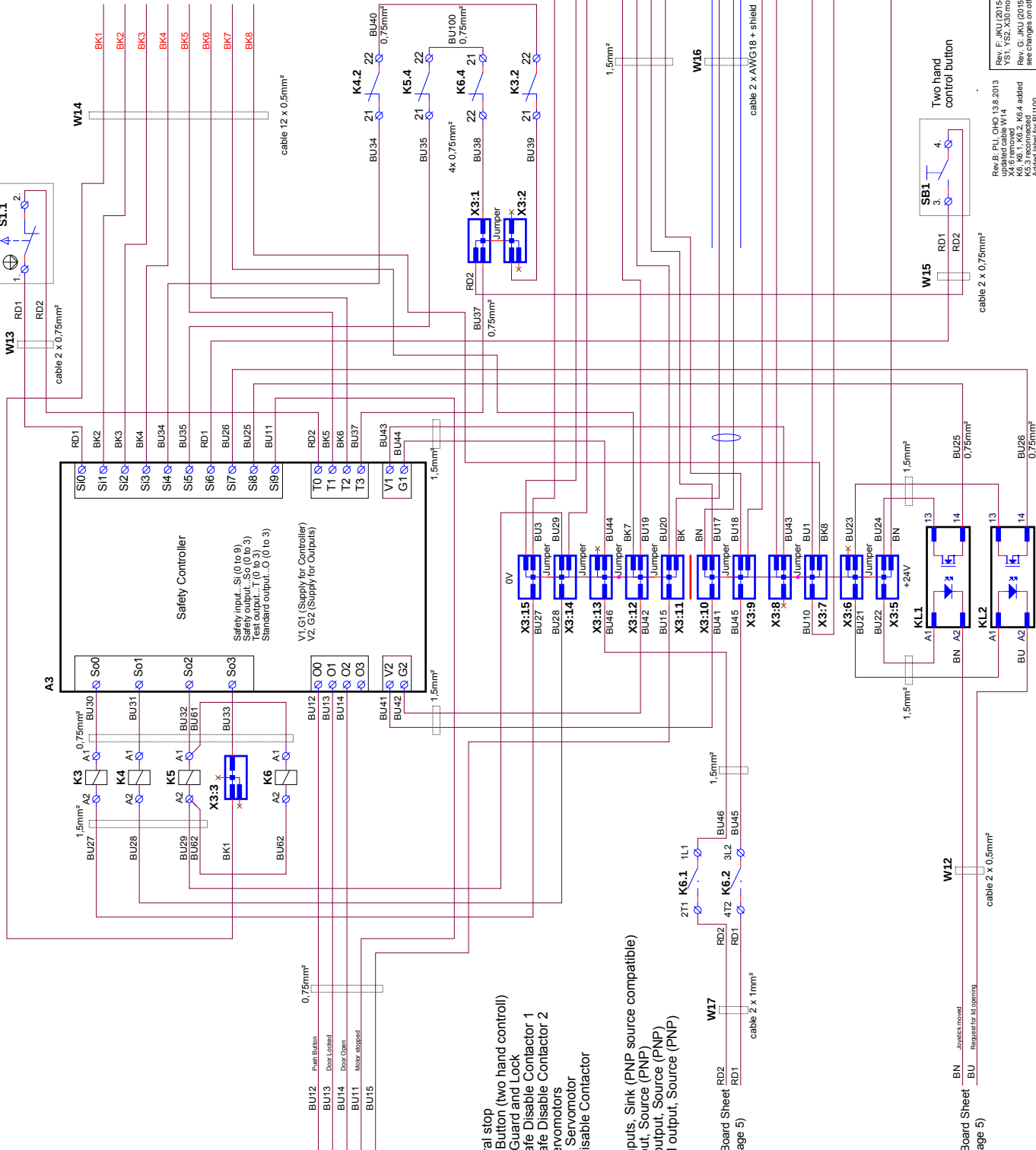
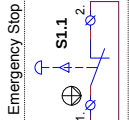
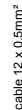
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A	2015-08-04	2015-08-04	JPO	SCA
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		ID:		Rev:
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		16141001 AIR DIAGRAM Magnutom 500		

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Fax: +45 44 600 804

[illegible]

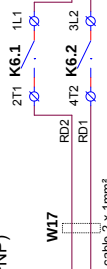
Rev. R. ELL (2015-13-2015)
GNVE: 15, 21, 22, 34, 42, 53, 38
changed to AAWG16
XPE 20, 34, 42, 69, 79
changed to FASTT07
XPE20 changed to XPE56
XPE88 changed to XPE65
XPE89 changed to XPE55
updated assemblies item numbers

BK = black
BN = brown
RD = red
OG = orange
YE = yellow
GN = green
BU = blue
VT = violet
GY = grey
WH = white
PK = pink
BE = beige
RO = rose
GNYE = yellow



S1.1 - Central stop
SB1 - Push Button (two hand control)
Y1 - Door Guard and Lock
Y3 - VFD Safe Disable Contactor 1
K4 - VFD Safe Disable Contactor 2
K5 - Y-Z Servomotors
K6 - X-table Servomotor
Safe Disable Contactor

Si - Safety inputs, Sink (PNP source compatible)
T - Test output, Source (PNP)
So - Safety output, Source (PNP)
O - Standard output, Source (PNP)

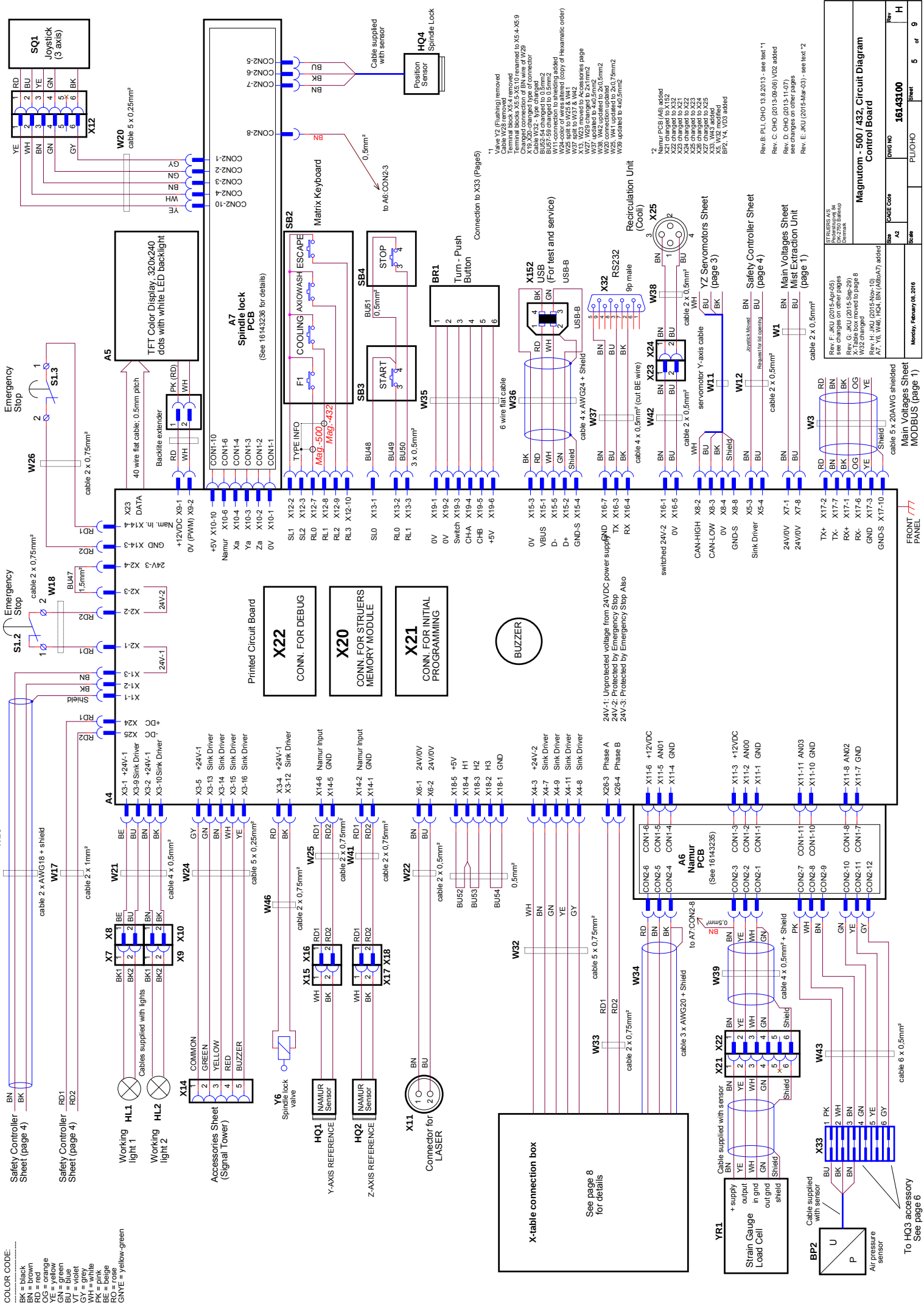


Control Board Sheet	BN	Joystick moved
	BU	Request for lid opening

STRUERS P.O. Box 100 DK-2600 Lyngby Denmark		Rev. E: JKU (2015-Mar-03) Rev. F: JKU (2015-Sep-29) Rev. G: JKU (2015-Sep-29) See changes on other pages Rev. H: JKU (2015-Nov-10) See changes on other pages			
Magnom - 500 / 432, Circuit Diagram Safety Controller		Size A2	PAGE Code DWG NO	Row 16143100	H
Tuesday, November 10, 2016		Scale	Sheet 4	of 9	PLI/OHO

COLOR CODE:

BK = black
BN = brown
BU = blue
OG = orange
YE = yellow
GN = green
RD = red
GY = grey
WH = white
PK = pink
PE = beige
GNVE = yellow-green



To HQ3 accessory
See page 6

FRONT PANEL

Rev. H

5 of 9

Sheet

16143100

DWG NO

PLUJOHO

Scale

Monday, February 08, 2016

Rev. F: J.KU (2015-Apr-05)

Rev. G: J.KU (2015-Sep-20)

Rev. H: J.KU (2015-Nov-10)

Rev. I: J.KU (2015-Mar-03)

Rev. J: J.KU (2015-Sep-20)

Rev. K: J.KU (2015-Sep-20)

Rev. L: J.KU (2015-Sep-20)

Rev. M: J.KU (2015-Sep-20)

Rev. N: J.KU (2015-Sep-20)

Rev. O: J.KU (2015-Sep-20)

Rev. P: J.KU (2015-Sep-20)

Rev. Q: J.KU (2015-Sep-20)

Rev. R: J.KU (2015-Sep-20)

Rev. S: J.KU (2015-Sep-20)

Rev. T: J.KU (2015-Sep-20)

Rev. U: J.KU (2015-Sep-20)

Rev. V: J.KU (2015-Sep-20)

Rev. W: J.KU (2015-Sep-20)

Rev. X: J.KU (2015-Sep-20)

Rev. Y: J.KU (2015-Sep-20)

Rev. Z: J.KU (2015-Sep-20)

Rev. AA: J.KU (2015-Sep-20)

Rev. AB: J.KU (2015-Sep-20)

Rev. AC: J.KU (2015-Sep-20)

Rev. AD: J.KU (2015-Sep-20)

Rev. AE: J.KU (2015-Sep-20)

Rev. AF: J.KU (2015-Sep-20)

Rev. AG: J.KU (2015-Sep-20)

Rev. AH: J.KU (2015-Sep-20)

Rev. AI: J.KU (2015-Sep-20)

Rev. AJ: J.KU (2015-Sep-20)

Rev. AK: J.KU (2015-Sep-20)

Rev. AL: J.KU (2015-Sep-20)

Rev. AM: J.KU (2015-Sep-20)

Rev. AN: J.KU (2015-Sep-20)

Rev. AO: J.KU (2015-Sep-20)

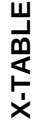
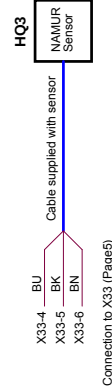
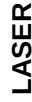
Rev. AP: J.KU (2015-Sep-20)

Rev. AQ: J.KU (2015-Sep-20)

Rev. AR: J.KU (2015-Sep-20)

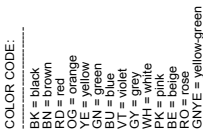
Rev. AS: J.KU (2015-Sep-20)

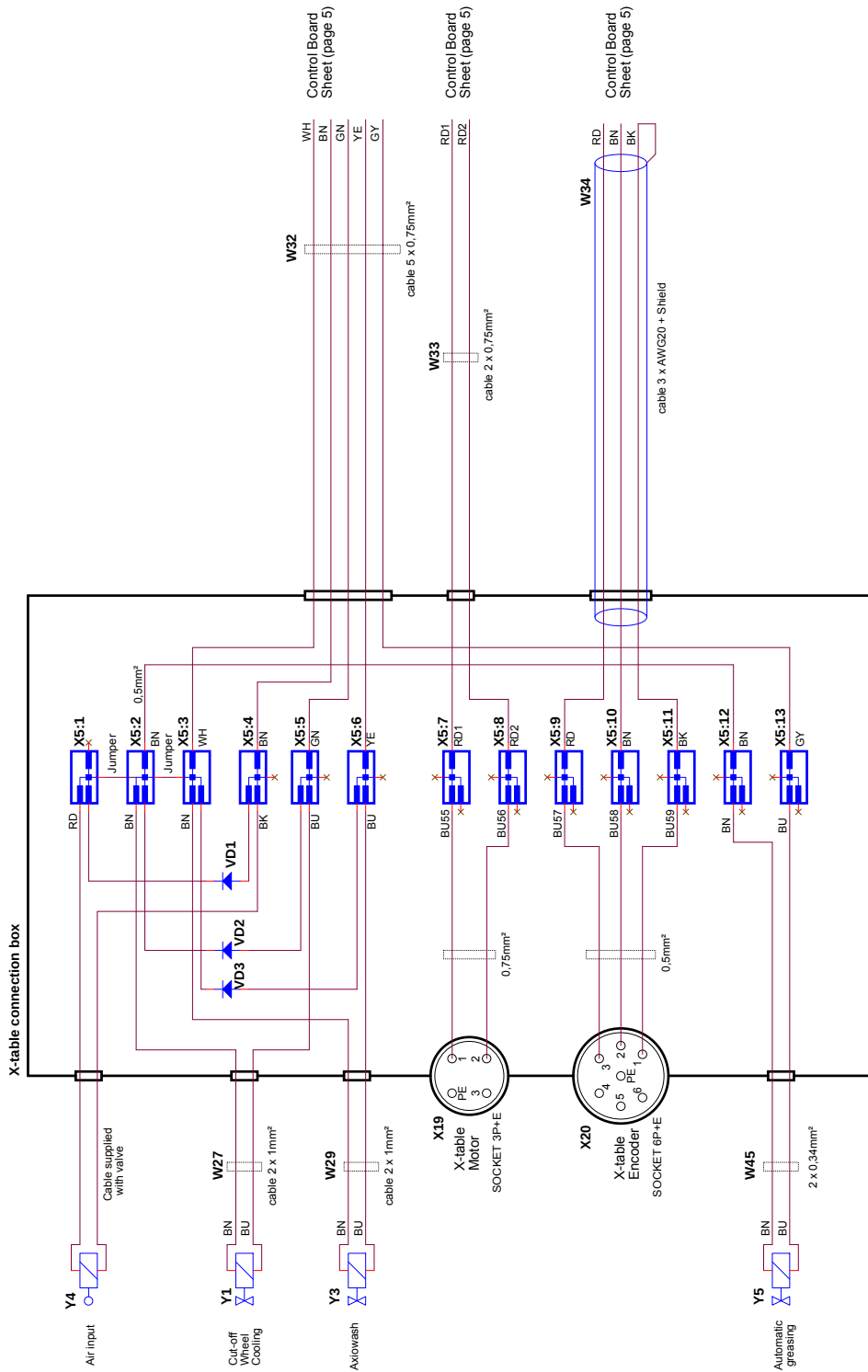
BK = black
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VT = violet
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WH = white
PK = pink
BE = beige
RO = rose
GNYE = yellow-green



Rev.B; P.LI, OHO 13.8.2013
Cable number W24 corrected to W23
Connector X27, X28 changed
W23= color of wires altered
W23= color of Hexamatic order)
(copy of Hexamatic order)
W23 renamed to W59
(same as Hexamatic)
X13 moved to this page
Rev. C: OHO (2013-09-06)
resistors R10-R13 added into A5
Rev. D: OHO (2013-11-07)
see changes on other pages
Rev. E: JUK (2015-Mar-03)
HQ3 added

Rev. F, JKU (2015-Apr-05) see changes on other pages	TRIERAS Petersenvej 84 DK-2650 Hvidovre Denmark	Magnetom - 500 / 432, Circuit Diagram Accessories						Rev	H
Rev. G, JKU (2015-Sep-29) see changes on other pages		Size	Scale	CAGE Code	DWG NO	Sheet	6	0	
Rev. H, JKU (2015-Nov-10) see changes on other pages		A2				16143100			
Thursday, 7 February 04, 2016									





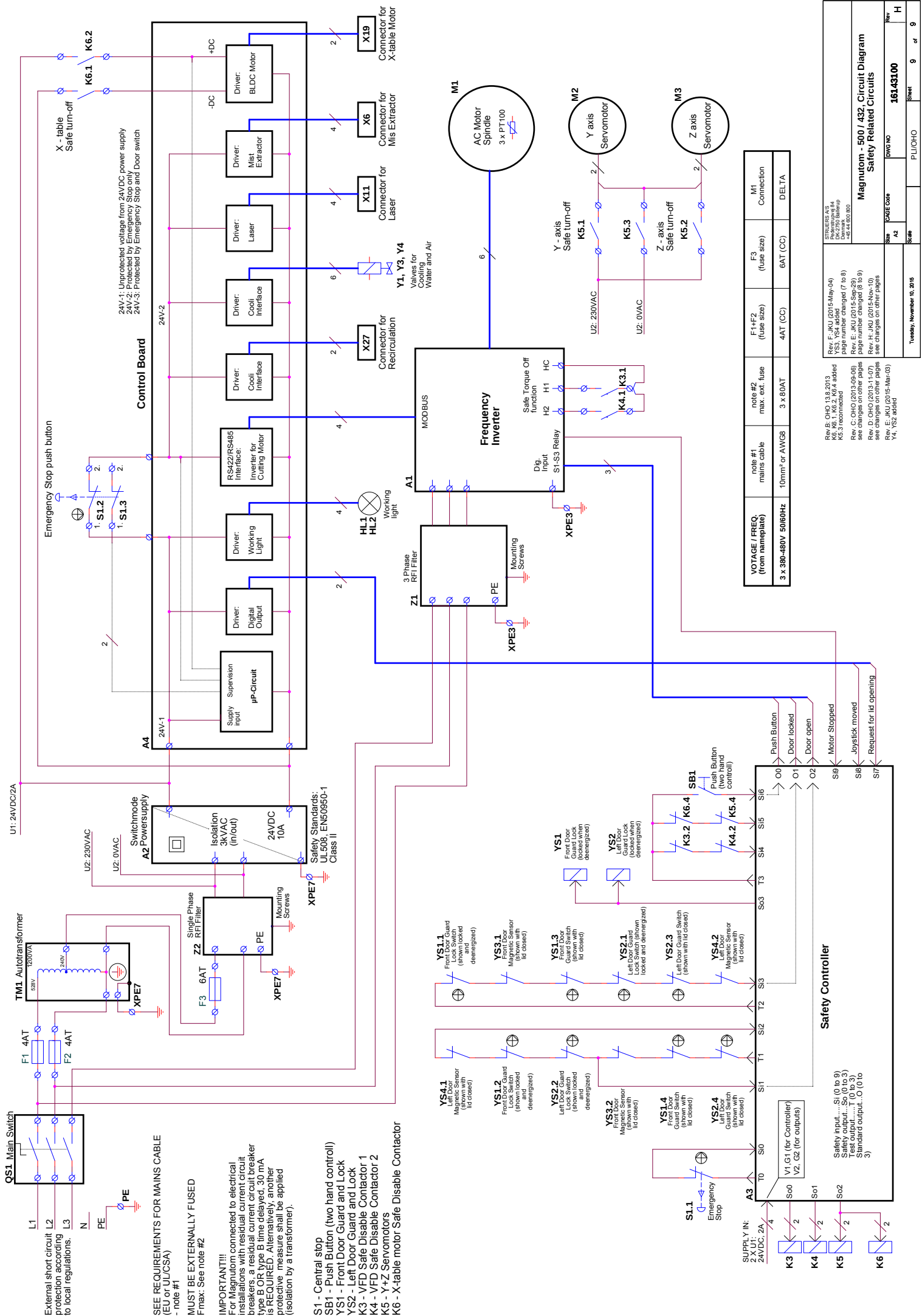
Rev. G. JKU (2015-Sep-29)
New page 8 created
Y5, W45 added, X5 changed
Rev. H. JKU (2015-Nov-10)
see changes on other pages

TABLE 103
P. 16143100
OK-2750 Ballup
16143100

Magnutom - 500 / 432, Circuit Diagram
X - Table box

Size: A2
Scale: 1:1
Date: Tuesday, November 10, 2015

Sheet: 8 of 9
Rev: H



7. 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.

EN ISO 16089:2015

The figures quoted are emission levels and are not necessarily safe working levels. Whilst 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 the characteristics of the workroom and the other sources of noise, i.e. the number of machines and other adjacent processes and the length of time for which an operator is exposed to the noise.

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."

IEC 61000-3- 12

This equipment complies with IEC 61000-3- 12 provided that the short-circuit power S_{sc} is greater than or equal to 5.9 MW at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to 5.9 MW.

8. Technical Data

Please refer to the [Magnutom brochure](#) for the general Technical Specifications.

Mains Cable Specification

Wire gauge	EU: 10mm ² Canada, USA: AWG8
Cable diameter	Max. 20 mm

External Short Circuit Protection

Magnutom must be protected with external fuses.
Suggested fuse size: 63A.

Residual Current Circuit Breaker

Electrical Installations with RCCB

For Magnutom connected to electrical installations with RCCB,
a type B time delayed, 30 mA RCCB is REQUIRED

Electrical Installations without RCCB

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



NOTE:

Local standards may overrule the recommendations for the main supply cable. If necessary, please contact a qualified electrician to verify which option is suitable for the local installation setup.

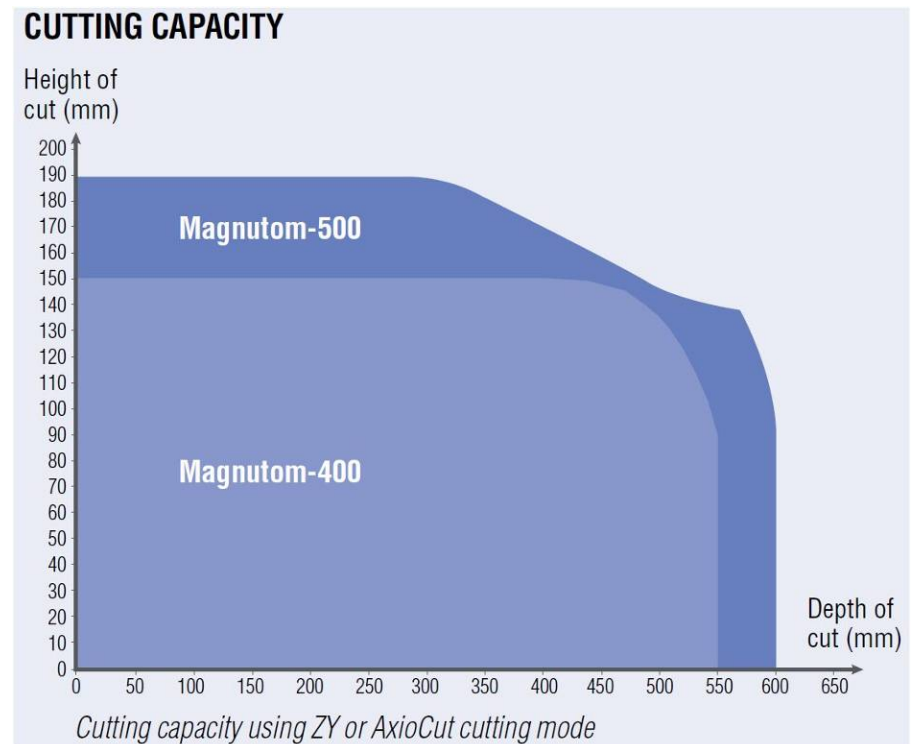
Operating environment

Surrounding temperature	5-40°C / 41-104°F
Humidity	0-85% RH non condensing
Storage temperature	0 – 60°C / 32 – 140°F

Noise level

Approx. 65 dB (A) measured at idle running, at a distance of 1.0 m/39.4" from the machine.

Cutting Capacity



The graph shows the projected cutting capacity under the following conditions:

- A new cut-off wheel.
- The workpiece is laid directly on the cutting table, with overhang where appropriate.
- Vertical clamping is used.
- Using ZY or AxioCut cutting mode

The actual cutting capacity depends on the sample material, cut-off wheel and clamping technique.

Quick Reference

Clamping the Workpiece

- Place the workpiece between the clamp and the back stop on the right hand cutting table.
- Push the clamp towards the workpiece and lock the quick-clamping device with the locking handle.

Starting the Cutting

- Position the cut-off wheel.
- Close the door(s).
- Press START . The cut-off wheel starts rotating and the cooling water starts running.

Stopping the Cutting

Automatic

- Set a Cut length or set to AutoStop in the *Edit method* menu.

Manual Stop

- Press STOP  and the cutting process stops. The cut-off wheel stops rotating and the cooling water stops.

Setting the Cutting Parameters

- In the Cutting Display, set each of the cutting parameters using the TURN/PUSH knob.

Changing the Cut-off Wheel

- Remove the nut with a fork spanner.
- Remove the flange and the cut-off wheel.
- Mount the new cut-off wheel.
- Mount the flange and nut. Tighten carefully and close the guard.

Cleaning the Cutting Chamber

AxioWash

- Press the AxioWash key to clean the cutting chamber.

Manual

- Point the flushing gun towards the bottom of the cutting chamber.
- Turn on the water by pressing the Flush key on the Control Panel.
- Clean the cutting chamber thoroughly.
- Turn off the water by pressing the Flush key again. Return the flushing gun to its holder.

Contents of the Declaration of Conformity

Manufacturer

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

Herewith declares that

Name:	Magnutom-400/-500
Function:	Cut-off machine
Type:	06276146, 06276246 / 06146146, 06146246

fulfils all the relevant provisions of the:**Machinery Directive
2006/42/EC**

according to the following standard(s):
EN ISO 12100:2010, EN ISO 13849-1:2015,
EN ISO 13850:2015, EN 60204-1:2006/AC:2010, EN 61010-1:2010.

and is in conformity with the:**EMC Directive
2014/30/EU**

according to the following standard(s):
EN 61000-6-2:2005, EN 61000-6-3:2007/A1:2011,
EN 61000-6-4:2007/A1:2011, EN 61000-3-3:2013, EN 61326-1:2013.

**RoHS Directive
2011/65/EU**

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

Supplementary Information

The equipment complies with the following standards:
NFPA70:2014, NFPA79:2012, FCC 47 CFR PART 15.

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

Authorized to compile the Technical File:

Klavs Tvenge
Director of Business Development
Struers ApS
Pederstrupvej 84
DK-2750 Ballerup, Denmark

