Magnutom

Instruction Manual

Manual No.: 16147001
Revision A

Date of Release 2018.01.16

Important

READ the instruction manual carefully before use.

Keep a copy of the manual in an easy-to-access place for future reference.

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).

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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.
Service Manuals: Struers Service Manual may only be used by a trained technician authorised by Struers. The Service Manual may only be used in connection with Struers equipment covered by the Service Manual.

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

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

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Magnutom
Safety Precaution Sheet

To be read carefully before use

1. The machine must be installed in compliance with local safety regulations.

2. 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.

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

4. Before transport, secure the drive shaft with the locking system provided.

5. 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.

6. 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).

7. The machine is not for use with saw-blade type cut-off wheels.

8. 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.

9. Observe the current safety regulations for handling, mixing, filling, emptying and disposal of the additive for cooling fluid.

10. 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.

11. Use of working gloves is recommended as workpieces may be both very hot and produce sharp edges. Wearing of gloves is also recommended when flushing and cleaning the machine.

12. Use of safety shoes is recommended when handling large or heavy workpieces.

13. Use of safety goggles and gloves are recommended when using the flushing hose.

14. Do not work on or around cutting table when the table is repositioned using the positioning joystick

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. The machine must be disconnected from the mains prior to any service.

21. All safety functions of the machine must be intact and in working order. The machine must be installed in compliance with local safety, regulations.

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

The following icons and typographic conventions are used in this instruction manual:

Icons and Safety Messages

ELECTRICAL HAZARD

indicates an electrical hazard 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.

General Messages

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

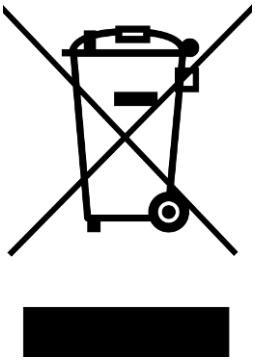
Information or Tip
indicates additional information and tips.

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
Italic type	indicates product names, items in software programs or figure titles
■ Bullets	indicates a necessary work step



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.

User's Guide

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1. Getting Started

Checking the Contents of Packing

The packing box contains the following items:

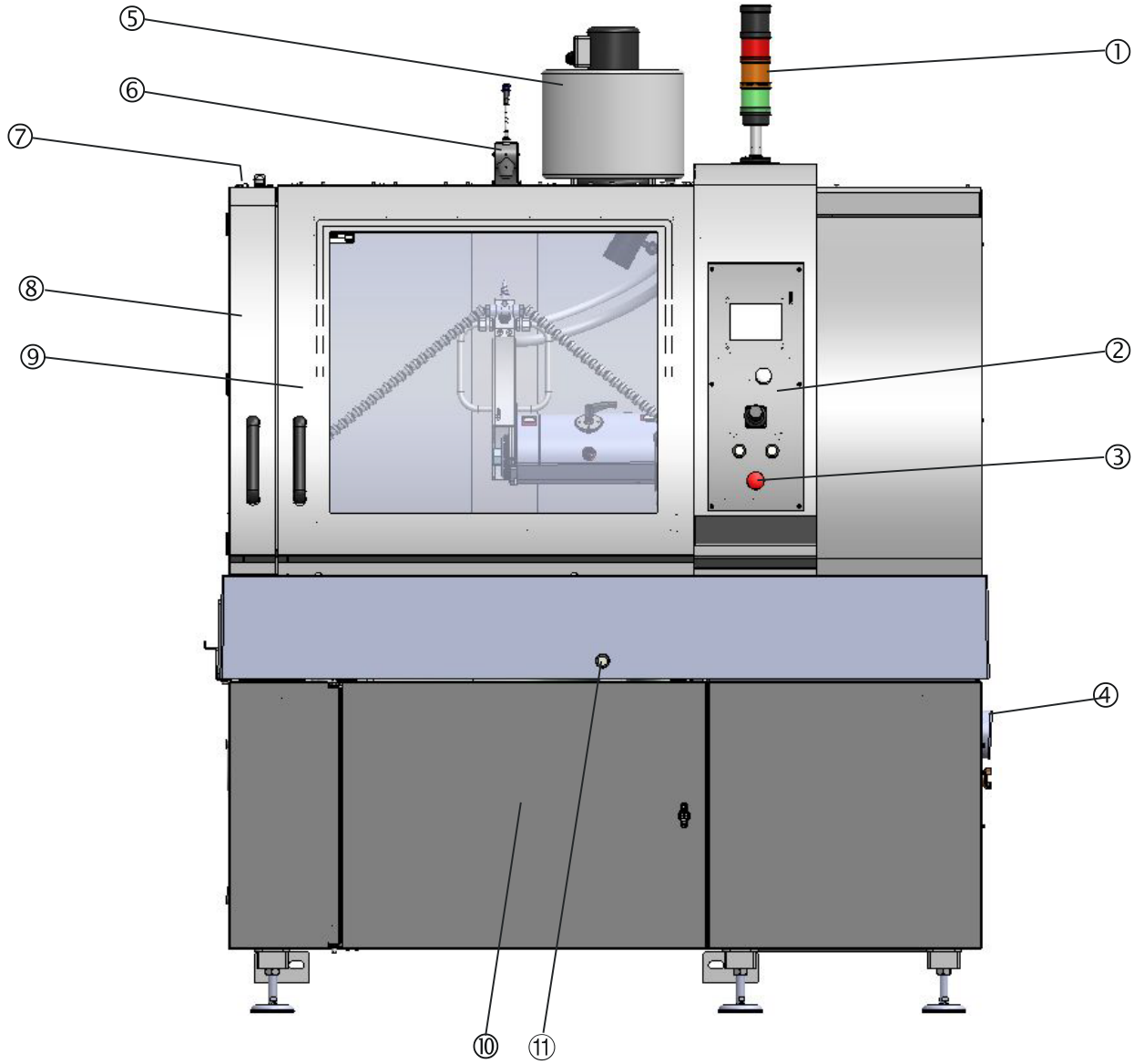
1 Magnutom
(high capacity cut-off machine)
4 Drain pipes for water outlet
3 Elbow pipes for water outlet
1 Fork spanner 36 mm
1 Key for hardware compartment
1 Key for door lock
1 Coolimat connection kit
1 Instruction Manual Set

Unpacking and Placing Magnutom

- 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.

Getting Acquainted with Magnutom

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



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

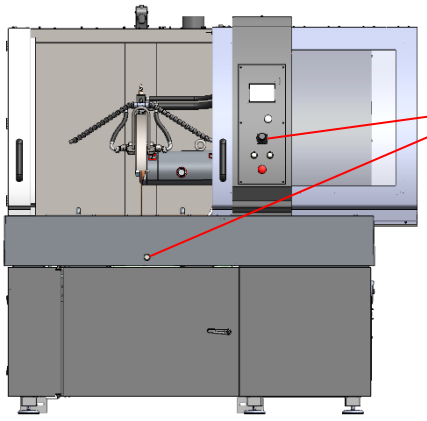
MAIN SWITCH
The main switch is located on the right hand side of the machine.
- Turn clockwise to switch on the power.

The EMERGENCY STOP is located on the front of the machine.
Emergency Stop
- Push the red button to Activate.
- Turn the red button clockwise to Release.

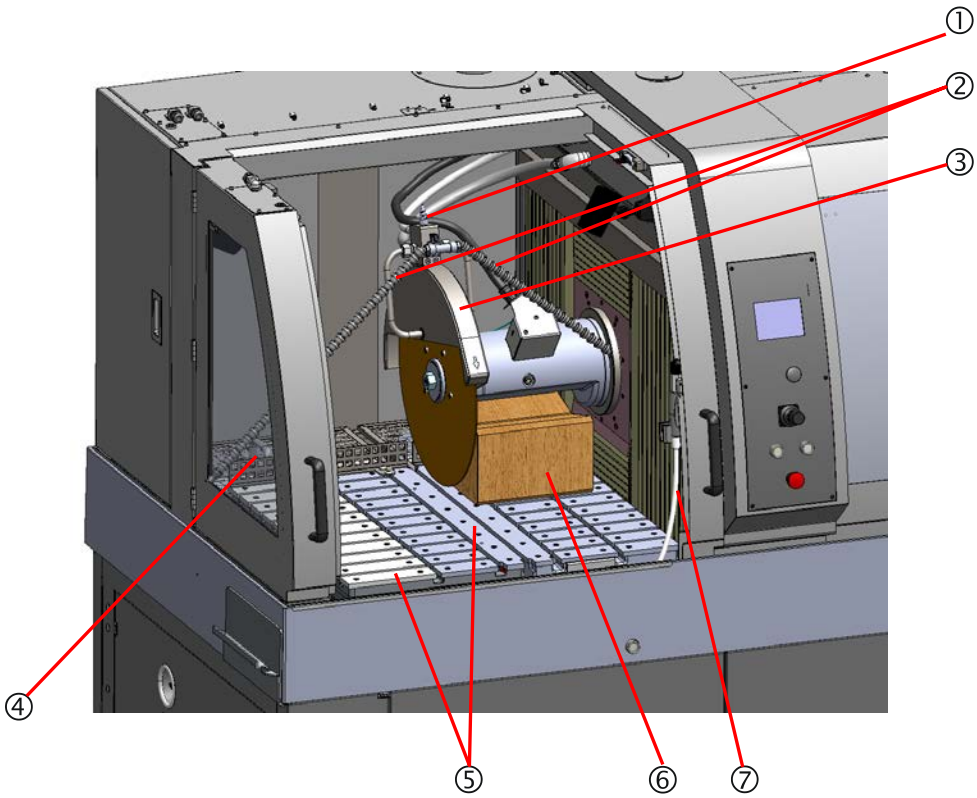
Important
Do not use the Emergency stop for operational stop of the machine during normal operation.
BEFORE releasing (disengaging) the Emergency stop, investigate the reason for activating the Emergency stop and take any necessary corrective action.

Hold-to-run operation

When moving the cut-off wheel whilst the protection hood or side door are open, press the Hold-to-run button on the front of Magnutom before operating the joystick.

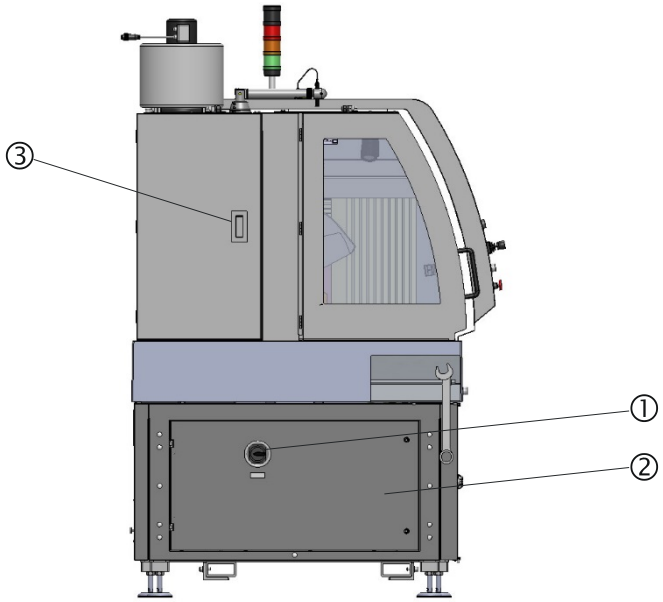


Inside the Cutting Chamber



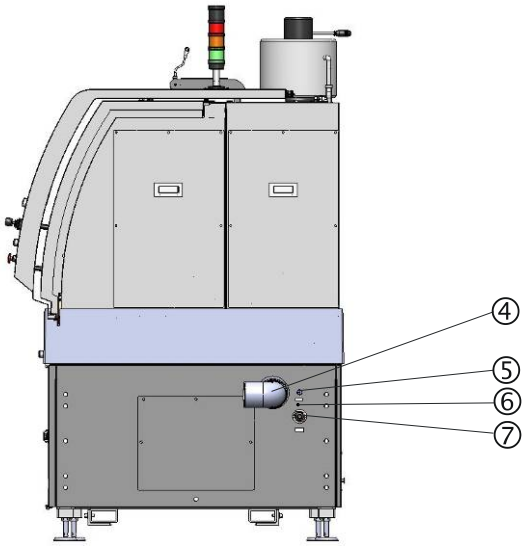
① AxioWash nozzle
② Flexible water jets
③ Guard for cut-off wheel
④ Removable grate (for catching specimens/ large pieces of debris)
⑤ Cutting table
⑥ Support block (only for machine transport then must be removed)
⑦ Flushing gun

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 cable[1] 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.

Important
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.

Tip
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:

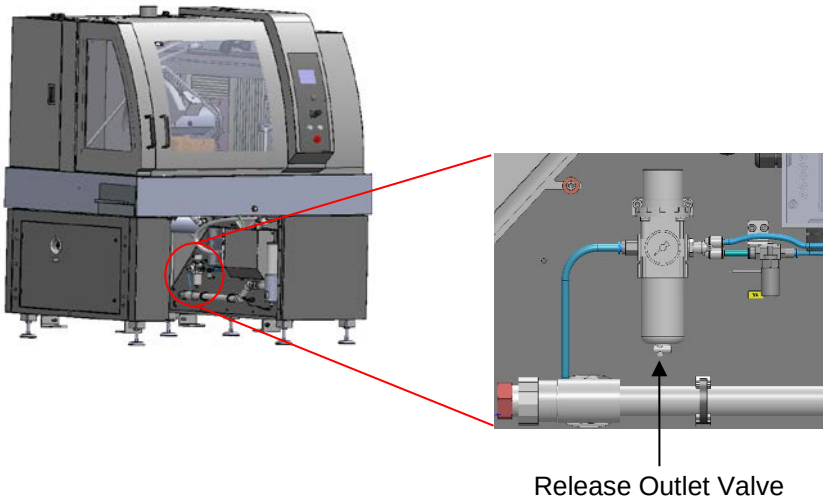
- Connect an 8 mm compressed air hose to the compressed air inlet.

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

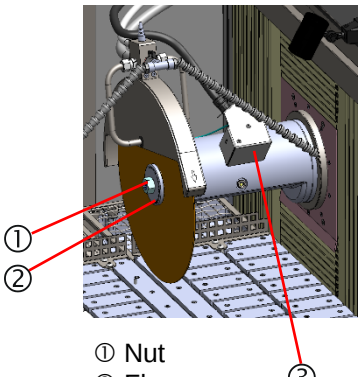
Emptying the Water / Oil Filter

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



① Nut

> ***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.

> ***Important***
> Conventional cut-off wheels based on Al_2O_3/SiC abrasives should be placed between two cardboard washers, to protect the cut-off wheel and flanges.

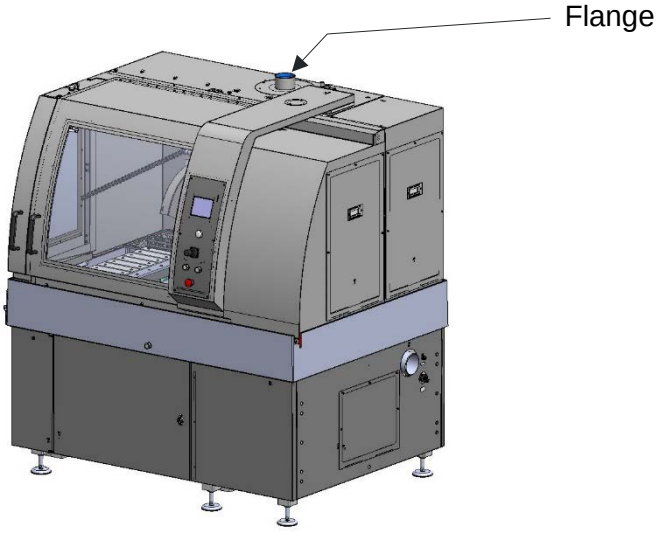
- Mount the flanges and nut. Tighten carefully.

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: 700m^3/h / 25,000 ft^3/h at 0 mm /0" water gauge.

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



Noise level

Approx. 67[2] dB (A) measured at idle running, at a distance of 1.0 m/39.4” from the machine
Use hearing protection if exposure to noise exceeds levels set by local regulations.

[2] "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." (ref. European standard EN ISO 16089:2015)

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

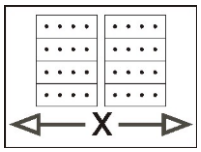
- Slide the cooling unit into the compartment under the Magnutom.
- Connect the 24 V / CAN control cable (supplied with the Cooling System) to the 24 V socket on the right hand side of Magnutom, and the other end to the Cooli control unit.
- ■ Connect the water inlet tube to the quick coupling on the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

Connecting Other External Filter Units

Important
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)

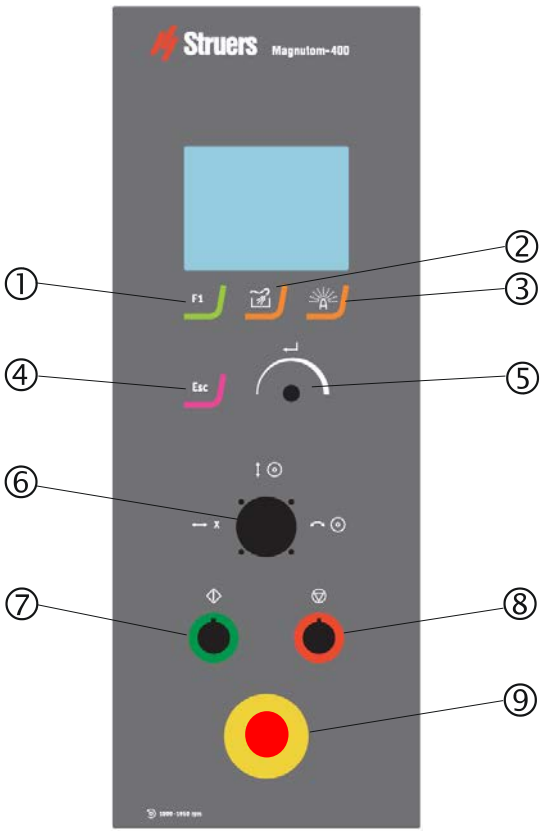


The X-table option is a motor driven, movable table. The table can be moved left to right by moving the joystick left or right.
The X-table option is required to use the Magnutom's MultiCut functions.

2. Operation

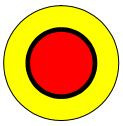
Using the Controls

Control Panel of Magnutom



Name	Key	Function
1 FUNCTION KEY	F1	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	Esc	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 -

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,
backwards 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.

Important

Take care when positioning the cut-off wheel.
A collision with the workpiece or clamping tool may dmage 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

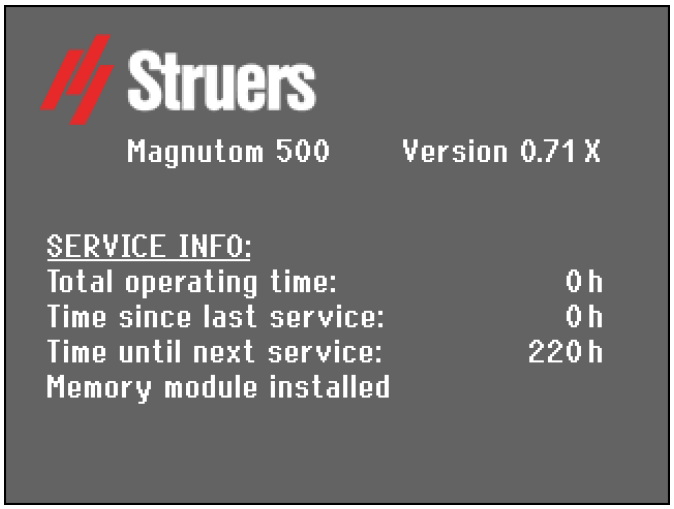
When the Magnutom is switched on for the first time, a screen on the control panel prompts you to select your preferred language. Then to set the date and time.

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.

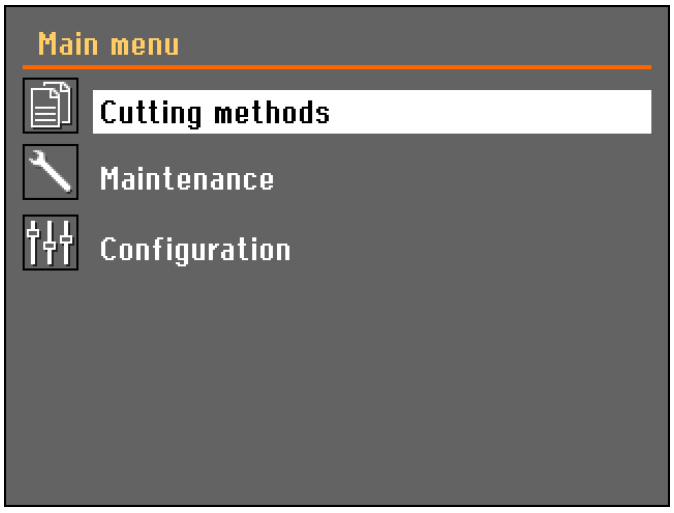
The display will then change to the last screen shown before Magnutom was switched off.

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.



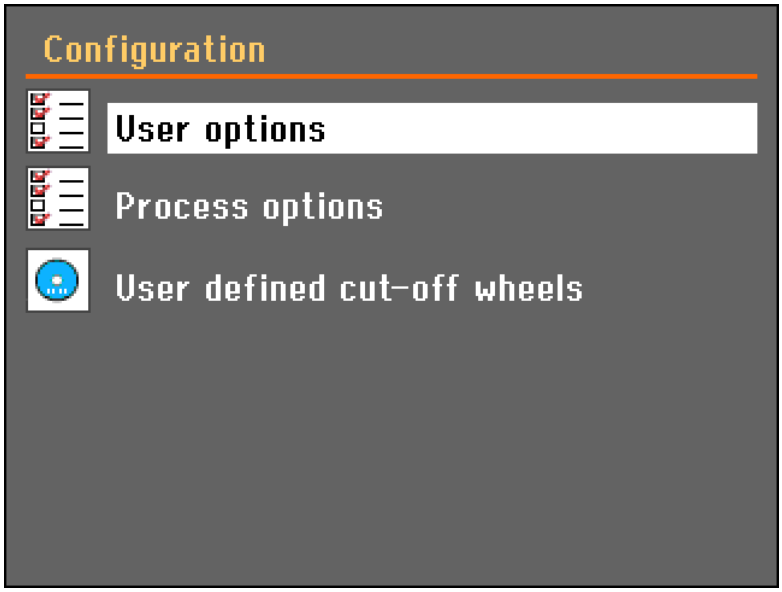
Changing the Language

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.

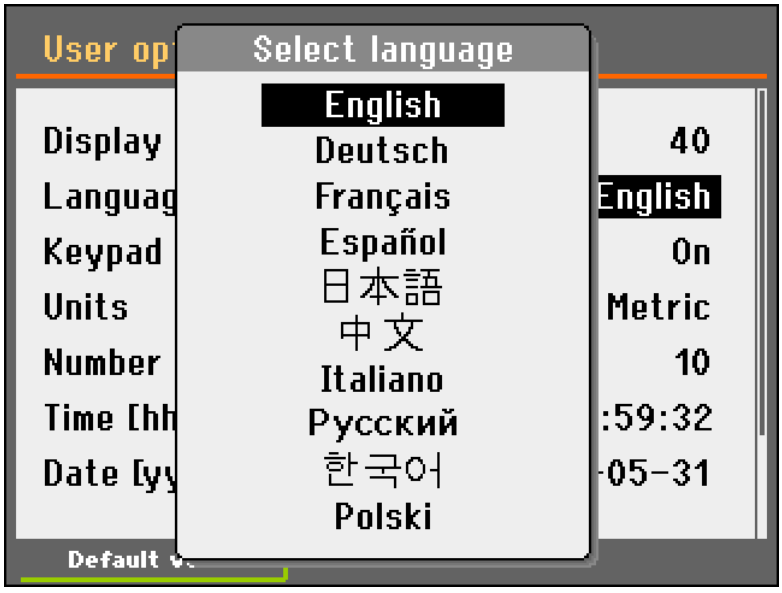
↓

↓

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

Turn knob to select the language you prefer.

↓



↓

Push knob to accept the language.

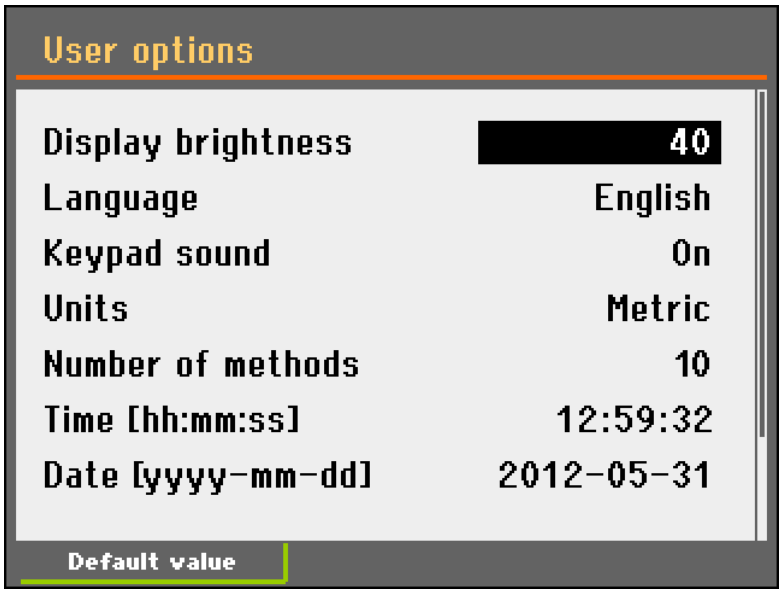
The Configuration menu now appears in the language you have chosen.

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).

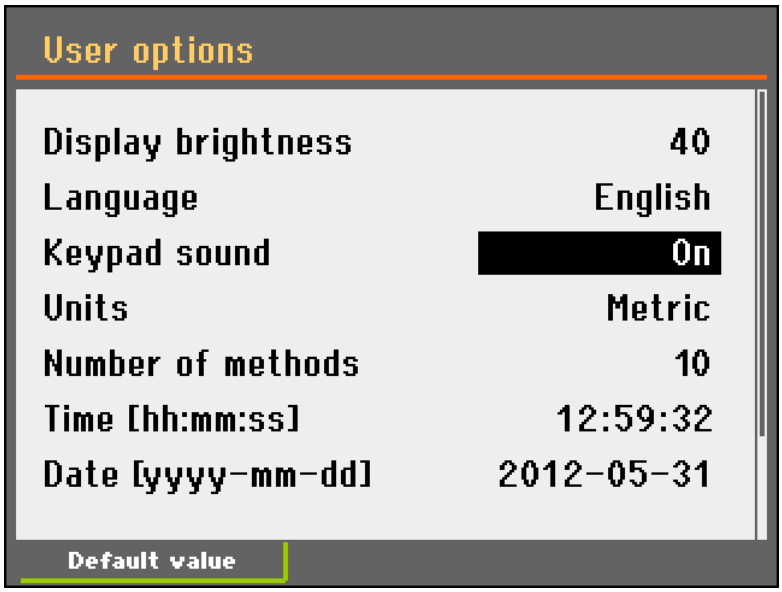
↓

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

Editing Alphanumeric Values

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

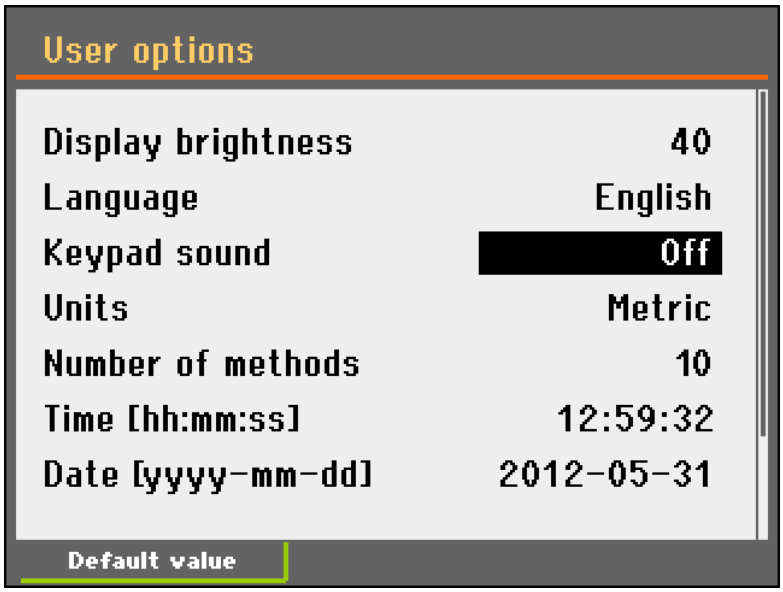
↓



↓

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.

↓

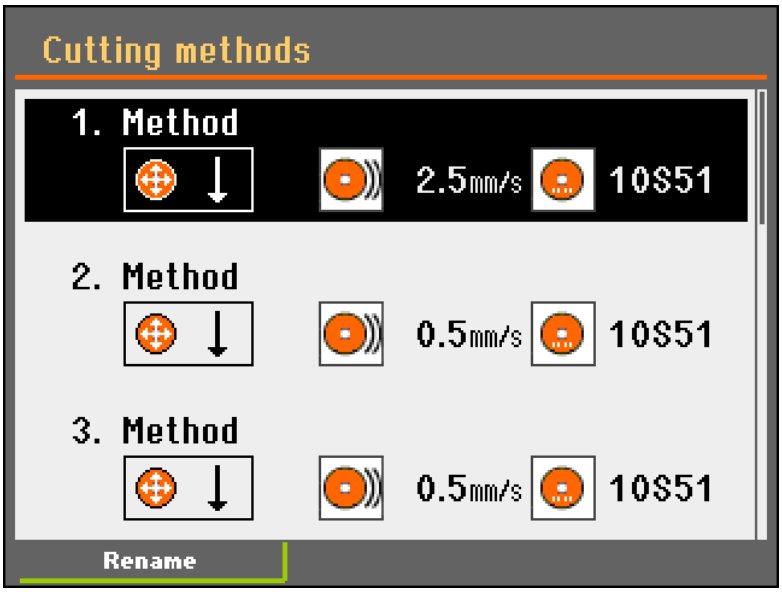
Press Esc to accept the option and return to the previous menu
Or turn knob to select and edit other options in the menu.

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.

↓

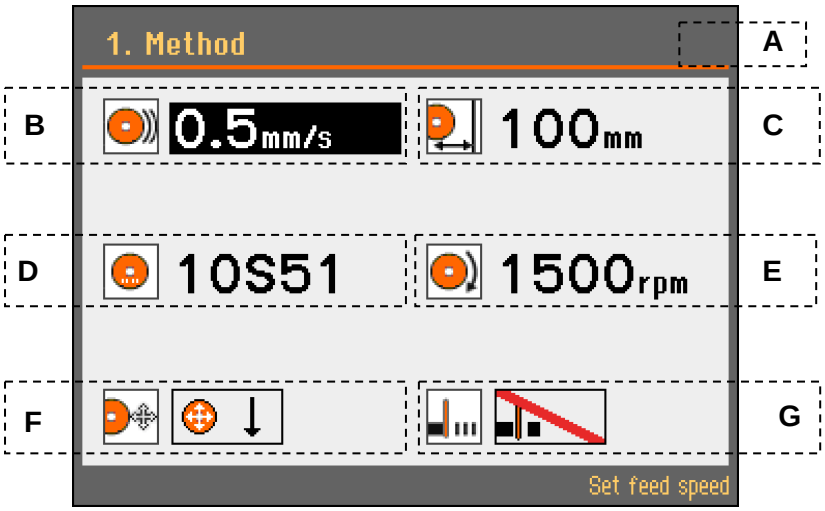
F1 Press F1 to open the *Text editor* menu.

↓

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.



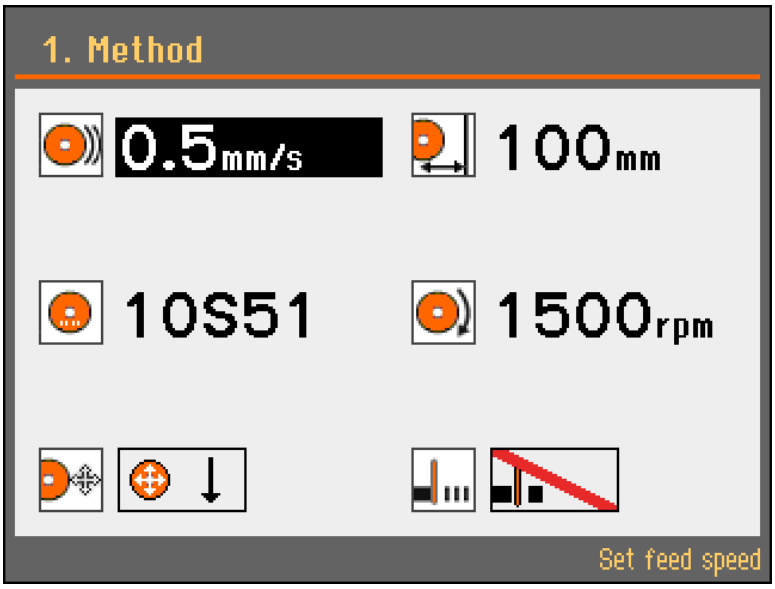
A Cutting method number
B Feed speed
C Cut Length
D Cut-off wheel
E Cut-off wheel speed
F Cutting mode
G MultiCut setup (only available with x-table option)

Editing the Parameters

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

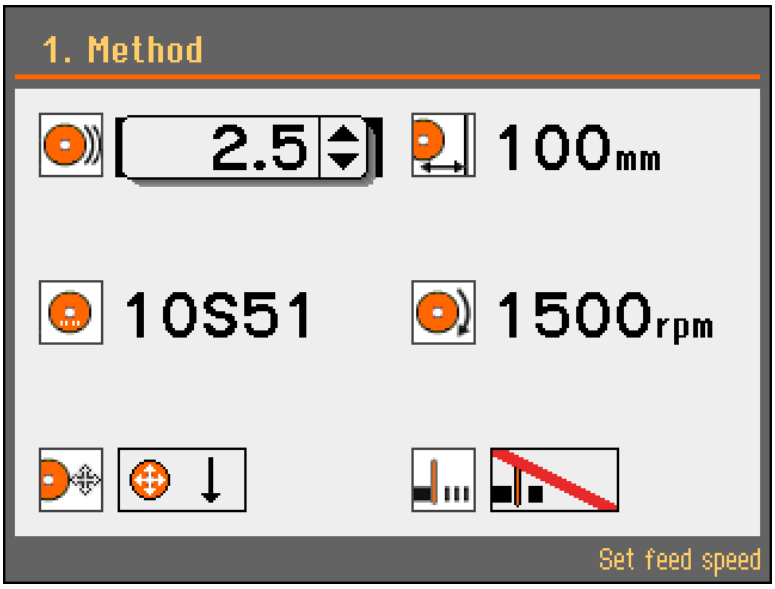
Push knob to open the editing menu.

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

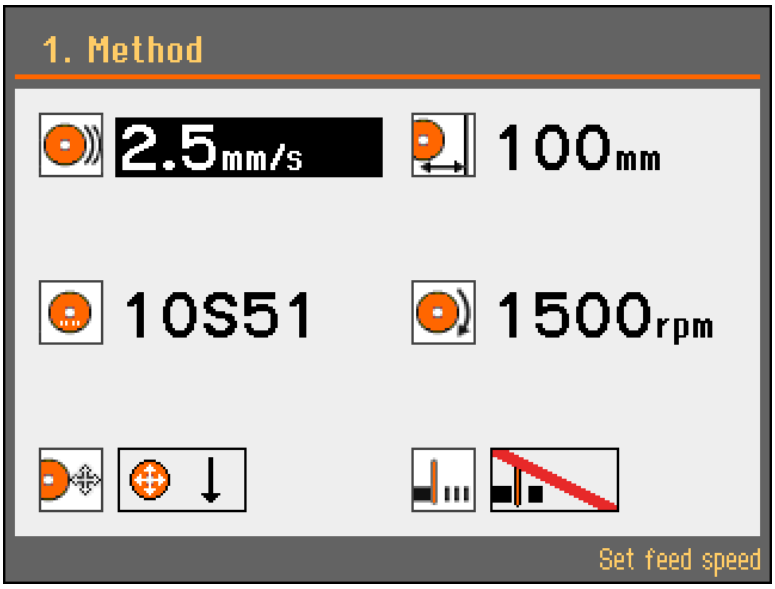


Push knob to select the parameter.
A pop-up menu appears.

Turn knob to adjust the value of the parameter.



Push knob to save the setting.



Feed speed

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

Cut length

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.

Setting a stop position

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.

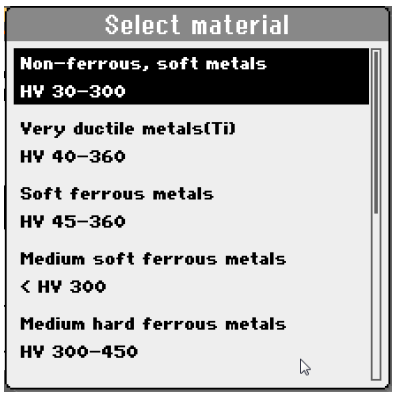
AutoStop

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.

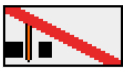
Icon	Cutting Mode	Typical use:
	Z Vertical cut	Vertical cut-length can be set. Cutting of larger samples
	Y Horizontal cut.	Horizontal cut-length can be set. Cutting of smaller samples
	Z+Y Combined cut	Vertical and Horizontal cut-length can be set. Cutting of extra-large samples Combined cut.
	AxioCut 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.

Important
Conventional cut-off wheels based on Al_2O_3/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.

- Mount the flange and nut. Tighten carefully and close the guard.

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.

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

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

Starting the Cutting

AutoCut: Off

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

Important
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 hood.
- 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.

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

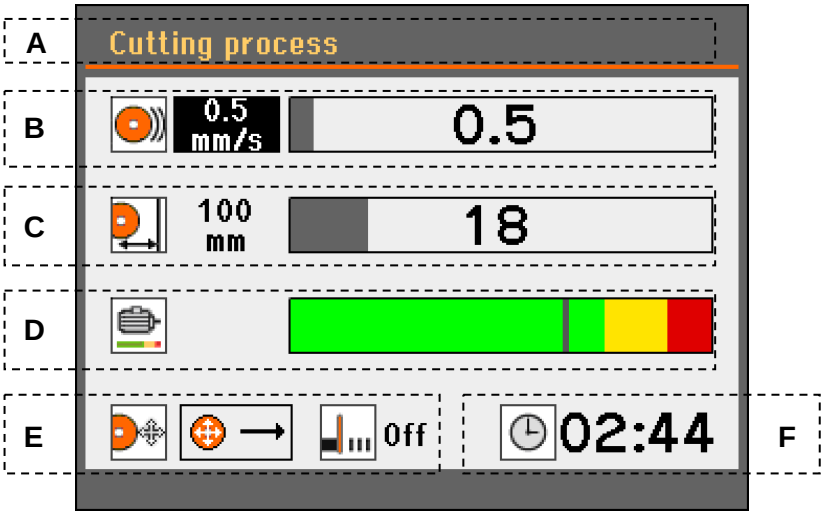
When AutoCut has been pre-programmed:

- Press START ⏀.
  - The cut-off wheel will advance at high speed to the pre-programmed start postion.
  - 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

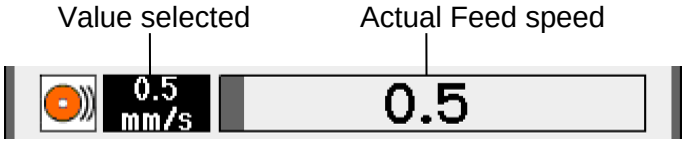
The Cutting process screen shows information about the cutting process including:

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

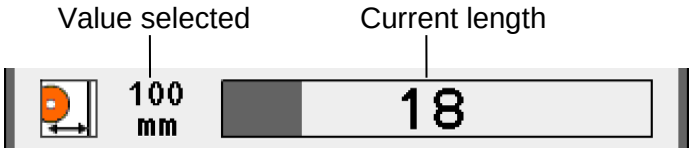


A Heading
B Feed speed
C Length of cut
D Motor load
E Cutting Mode
F Timer Countdown

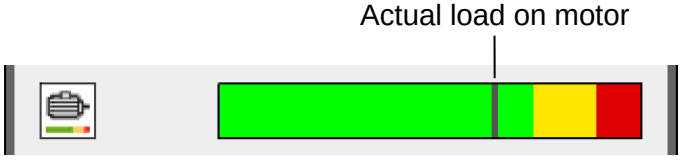
Feed speed



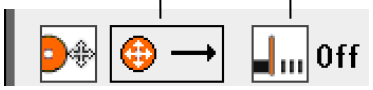
Length of cut



Motor load

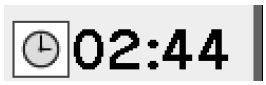


Cutting Mode



(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 ▽.

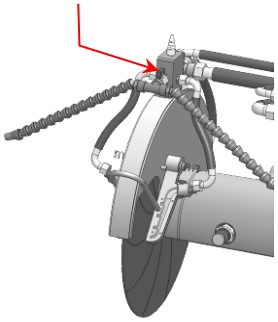
- Press STOP ▽ to manually interrupt the cutting process.

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.

Important
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.

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

Important
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.

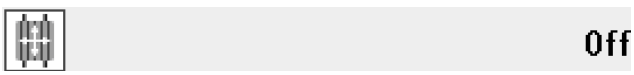
Full Z movement: cut-off wheel arm cycles backwards and forwards and between the lowest and the highest Z position.

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 hood 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.

Manual cleaning

When AxioWash is finished:

- 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

Risk of wet floor/ slipping hazard.

- Do not clean the roof of the cutting chamber or directly on the doors with the flushing gun.

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 matal 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 cover 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

Important.
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.

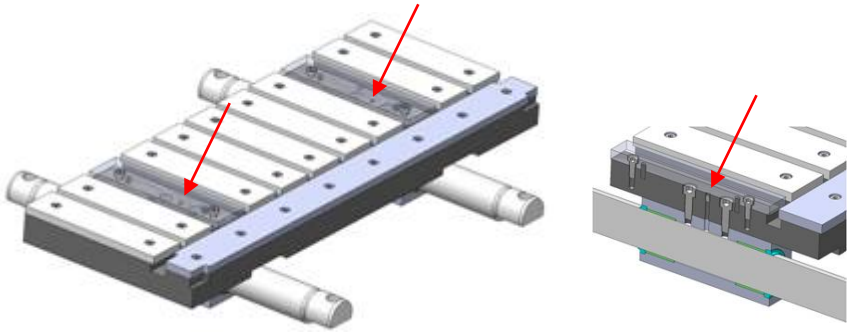
Lubricating the Cutting Table
Part of Struers ServiceGuard

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.

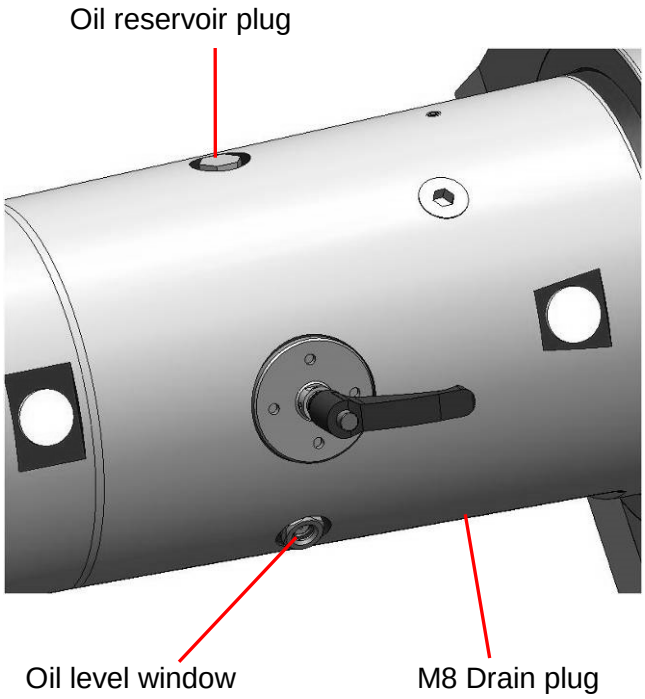
Lubricating the Drive Shaft Spindle

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:

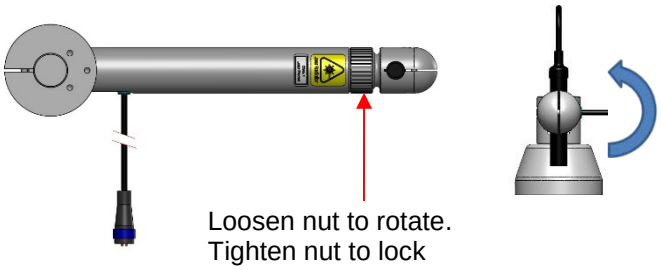
- Move the drive shaft as far forwards and as low down as possible.
- Place a bowl under the M8 drain plug (on the bottom of the drive shaft).
- Remove the plug from the oil reservoir, then unscrew the drain plug on the bottom and allow the oil to drain.
- When the spindle is empty, replace the drain 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.



Important
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.

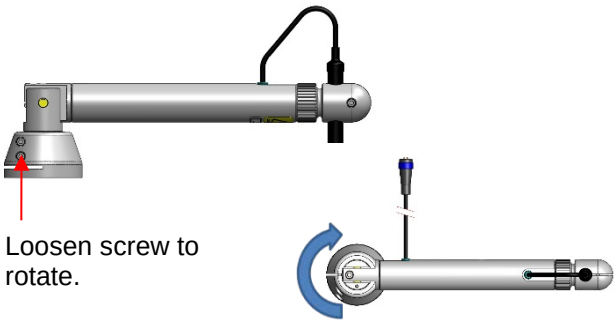
Adjusting the Laser
Option
Rotating the laser:

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



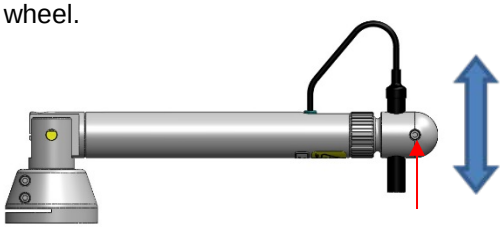
Loosen nut to rotate.
Tighten nut to lock position.

Rotating the laser arm:



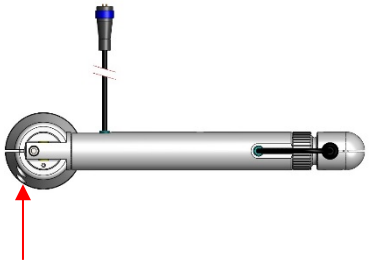
Loosen screw to rotate.

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

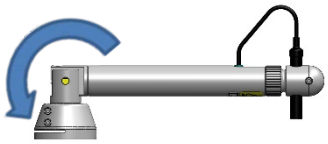


Tighten screw to fix laser in the laser arm.

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



Loosen screw to lift the laser arm.
Tighten screw to fix the position of the laser arm.



Yearly

Inspection of Cover

Part of Struers ServiceGuard

The protective cover consists of a metal frame and a composite material (PETG) screen that protects the operator. In the event of damage, the screen will be weakened and offer less protection.

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

Important
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 Cover

To ensure its intended safety, the PETG screen must be replaced every 5 years[3]. A label on the screen indicates when it is due to be replaced.

The cover 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.
A label on the cover indicates when the screen is due to be replaced.

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

[3] Replacement of the screen is required to remain compliant with the safety requirements in the European standard EN 16089.

Testing Safety Devices

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

- Start a cutting process.
- Activate the Emergency-stop.
  If cutting does not stop, press STOP ⏀ and contact Struers Service.

- Open the door
- Press start.
  If cutting starts, press STOP ⏀ and contact Struers Service.

WARNING

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

Reference Guide

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1. Advanced Operations

Configuration Menu

A number of different settings and parameters can be set or adjusted from the *Configuration* menu.
There are 3 under 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 *Edit method* 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

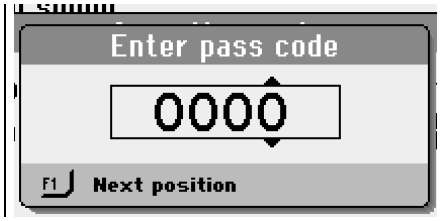
Development: No access to parameters in CONFIGURATION menu, except Display contrast

Production: Access to START, STOP, *Stop position* 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.

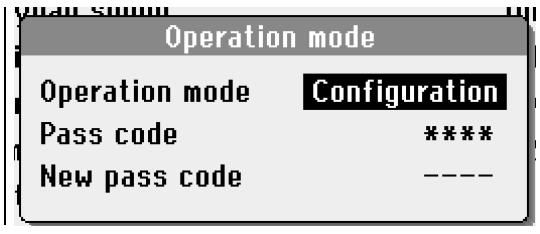


↓

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.

↓



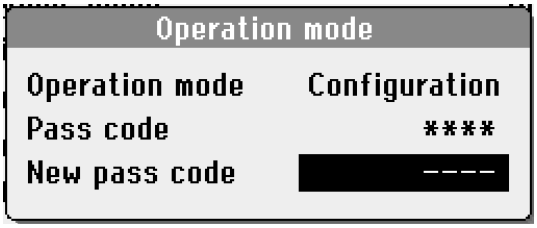
Push knob to select **Configuration**.

↓

Select the desired operation mode and push knob to confirm.

New Pass Code

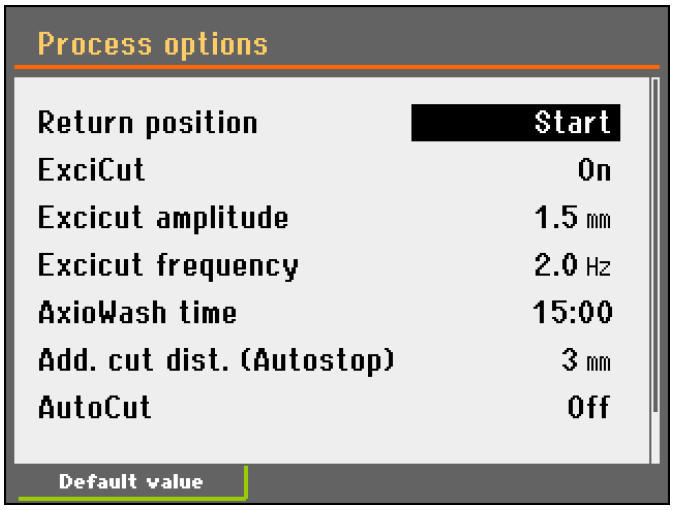
A New pass code can also be selected from the *Operation mode* menu.



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.

Important
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:

Start: Magnutom automatically retracts the cut-off wheel to the original position of the cut-off wheel, at the time you pressed START ◇ (default).

Zero: 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).

Stay: The cut-off wheel stays in position after the cut is completed.

Top & Rear: Magnutom automatically retracts the cut-off wheel to the rear of the chamber and to its top position.

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

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

ExciCut

ExciCut cutting action can be set to On or Off.
Default value - On

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

ExciCut amplitude	Can be set in the range 0.5 – 4mm, in steps of 0.5 Default value1.5 mm
ExciCut frequency	Can be set in the range 0.2 – 2.5Hz, in steps of 0.1 Hz. Default value 0.5 Hz

Tip
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

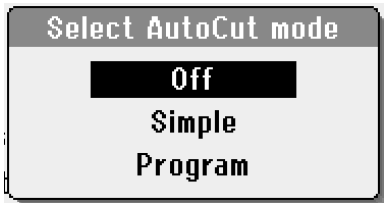
Can be set in the range 0.30 – 30:00 in steps of 0.30mins.
Default value 15 mins

Additional Cutting Distance (AutoStop)

An additional distance can be set to ensure that the workpiece is completely cut through when the *AutoStop* is selected.
Can be set in the range 0 – 20 mm, in steps of 1 mm.
Default value 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.

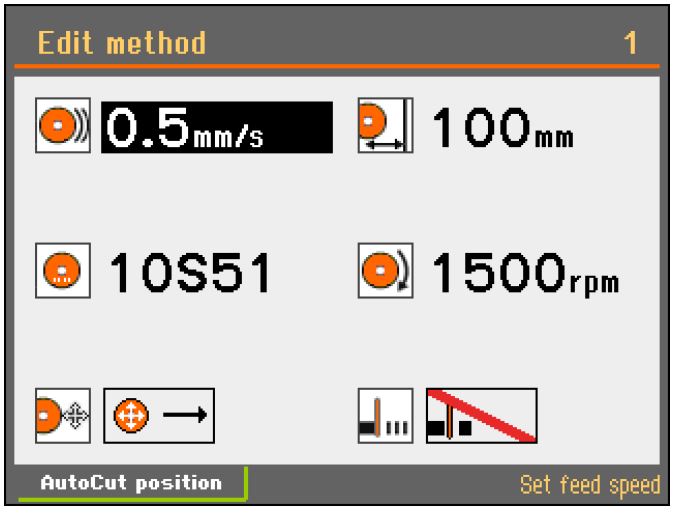
When an AutoCut position is set:
The cut-off wheel will advance at high speed to the pre-programmed start position when START is pressed.
After reaching this position the speed is reduced until contact is made with the workpiece**.**
After contact with the workpiece, the cut-off wheel is automatically 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.

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

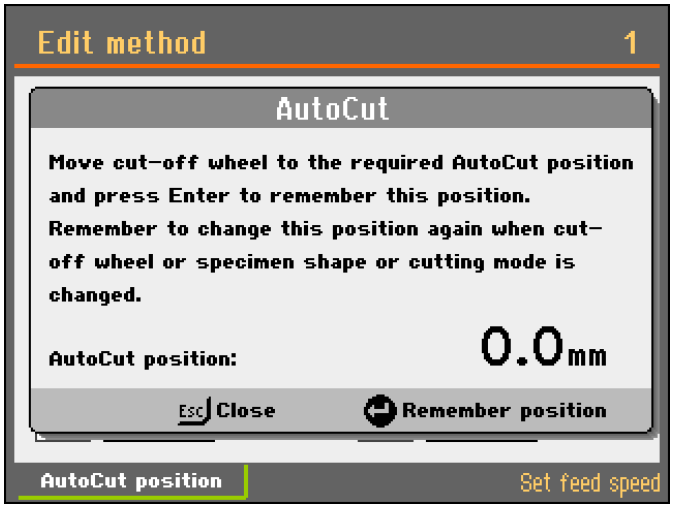
Setting an AutoCut position:

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)

↓

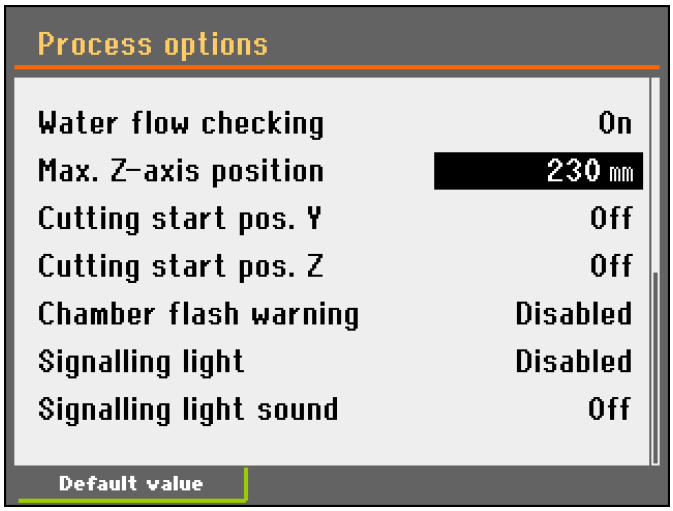


Use the Joystick to move the cut-off wheel to the required AutoCut start position.

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

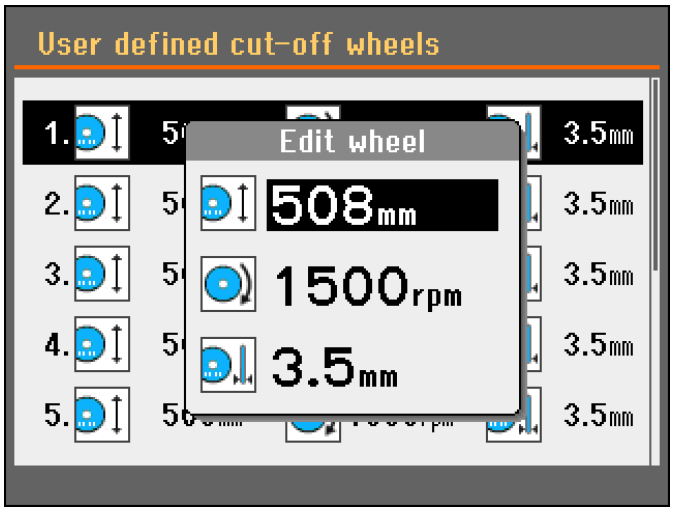
Can be set to Off or between 100 to 240 mm
Default value – 240 mm
This can be used to limit the Z movement of the cutting arm. This function is useful when using special clamping devices or workpieces with irregular geometries.

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	Can be set to Off or between 0 to 385 mm Default value - Off
Cutting start pos. Z	Can be set between 0 to 230 cm or Off Default value - Off 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	Can be set to On or Off Default value - Off
Signalling light	Can be set to On or Off Default value - Off Please refer to the section on *Signalling light* (option) on page 24 for details.
Signalling light sound	Can be set to On or Off Default value - Off Please refer to the section on *Signalling light* (option) on page 24 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.



Size — Can be set in the range 300 – 508mm
Default value 508mm

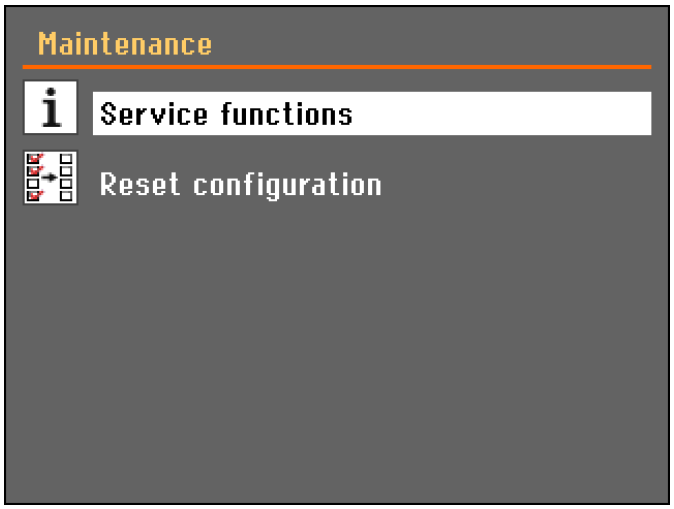
RPM — Can be set in the range 1000 – 1850 rpm (Magnutom-500)
1000 – 1950 rpm (Magnutom-400)
Default value 1500rpm

Width — Can be set in the range 1.0 – 6.0 mm
Default value 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.

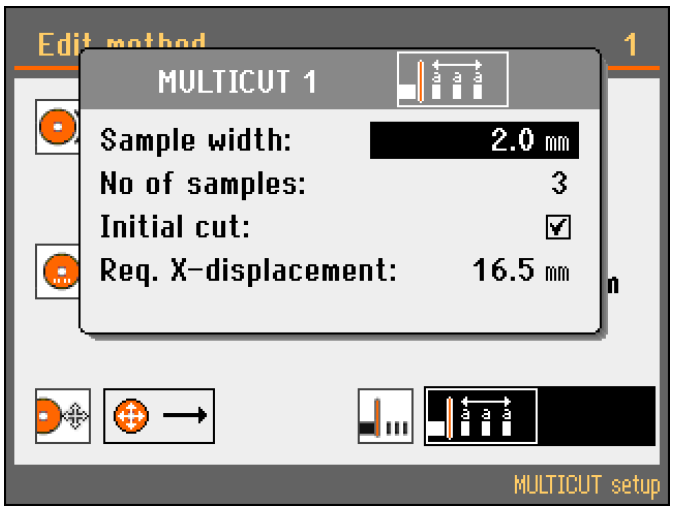
The function can be disabled in the Configuration menu.

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.

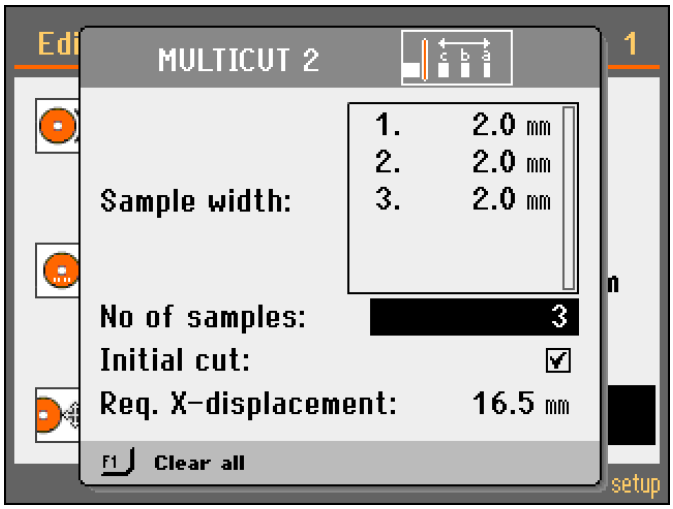
Initial cut: ☑
Required X-displacement = (Sample width + Thickness of cut-off wheel) x (No. of samples +1)

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

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.

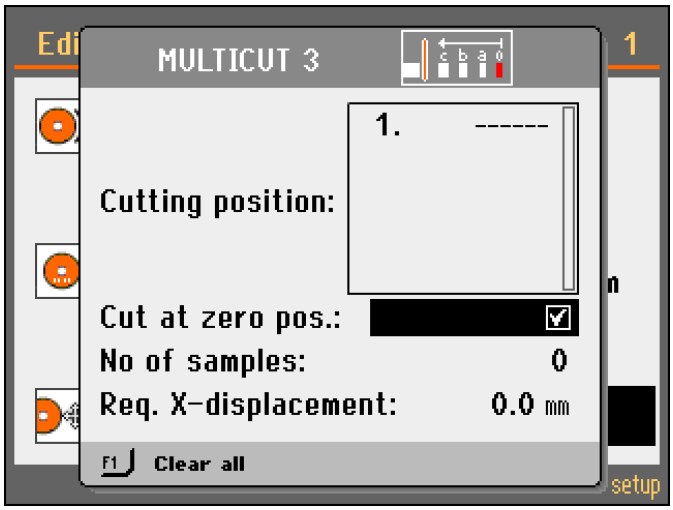
For samples 1 to n:

Required X-displacement = (Sample width 1 + Thickness of cut-off wheel) + (Sample width 2 + Thickness of cut-off wheel) +…… (Sample width n + Thickness of cut-off wheel)

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

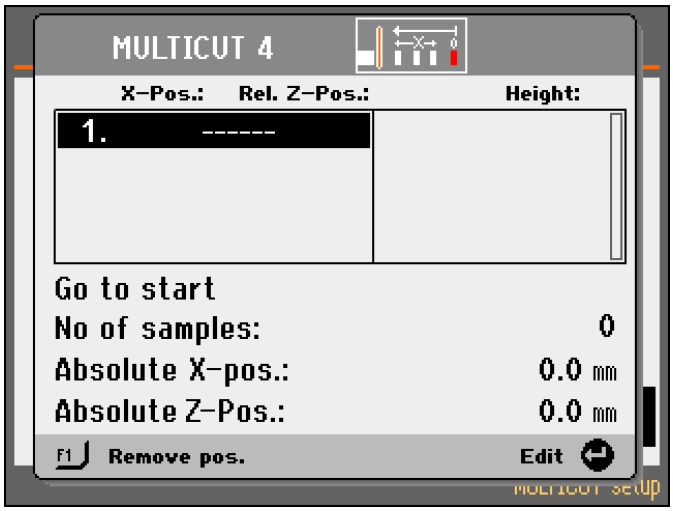
This parameter is calculated by the Magnutom to tell you the length of the X-displacement needed to cut your samples, based on the parameter settings.

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.

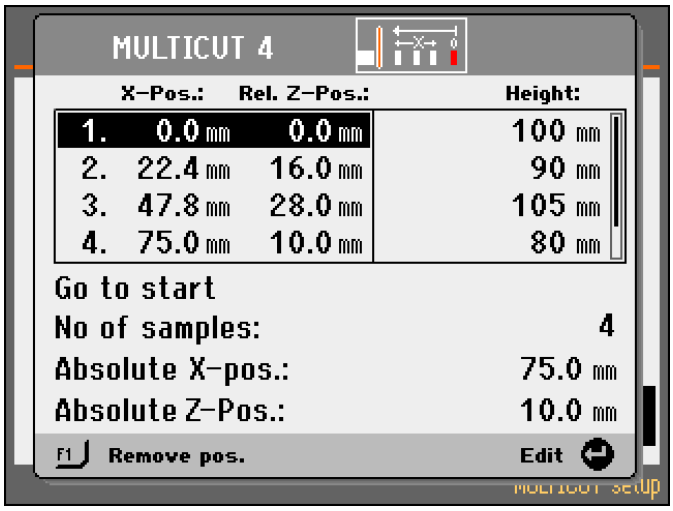
Absolute Y-pos. /
Absolute Z-pos.

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.

Important
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:



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.

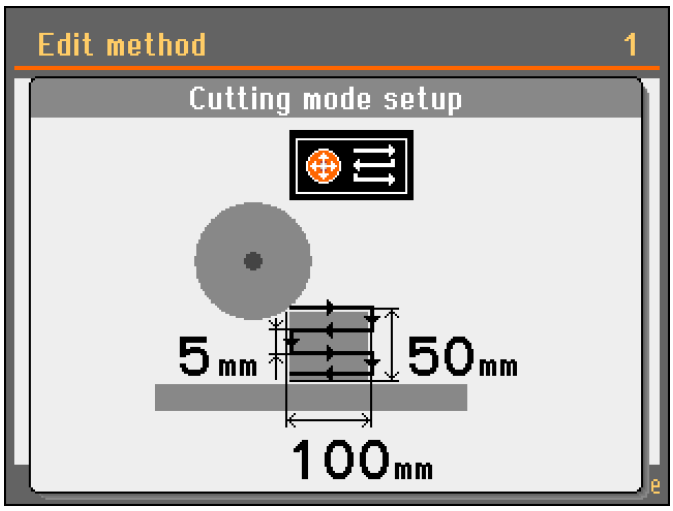
Important
Do NOT move the cut-off wheel back to its position immediately before STOP was pressed.
When START is pressed, Magnutom registers this as a new start position and will return to this position after the cut is finished. The cut-off wheel will be damaged if it is still inside the workpiece when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

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

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.

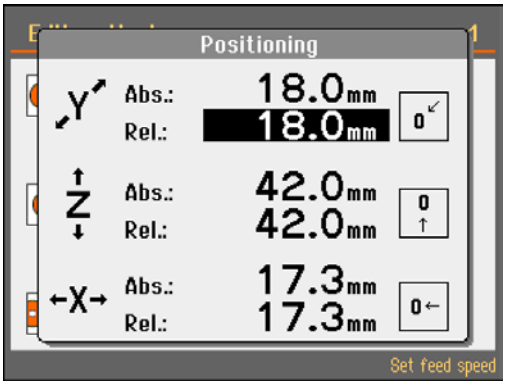
- Clamp the workpiece and position the cut-off wheel just above the workpiece.
  This position is automatically set to 0 (zero). Accordingly, as soon as Start has been pressed, the actual position of the cut-off wheel, becomes a relative starting point (zero), from where the cutting depth is calculated.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



Y - direction

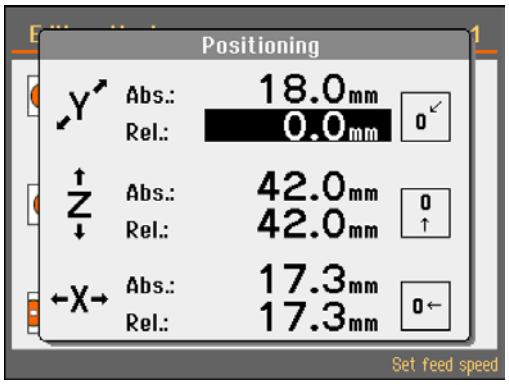
Z - direction

X - direction

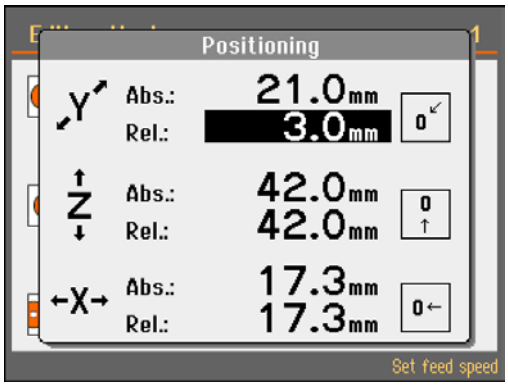
Setting a Relative Zero Position

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.

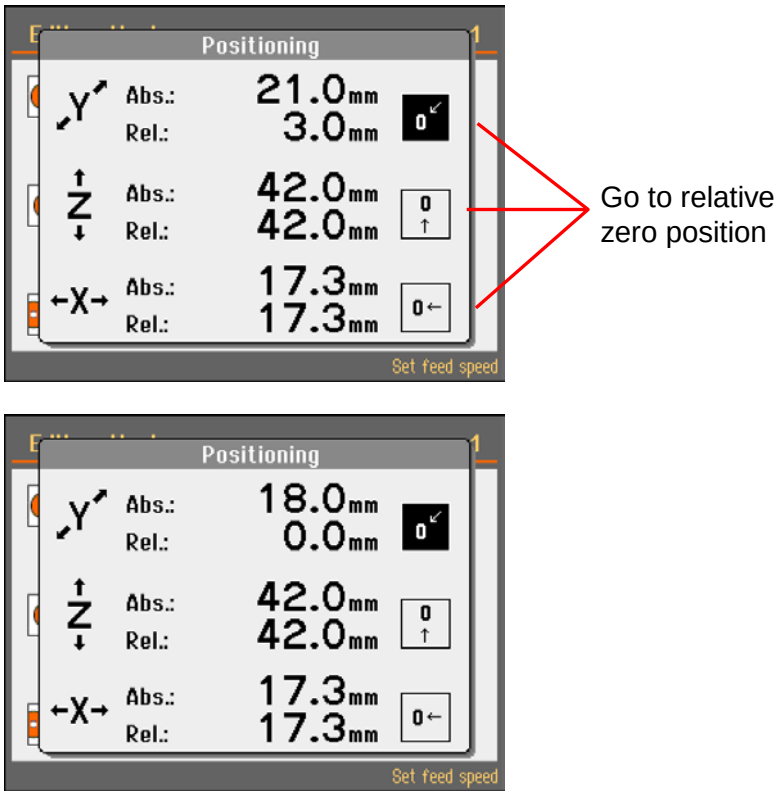


When the cutting arm is moved, the relative position now shows the value in regard to the previously defined zero position.



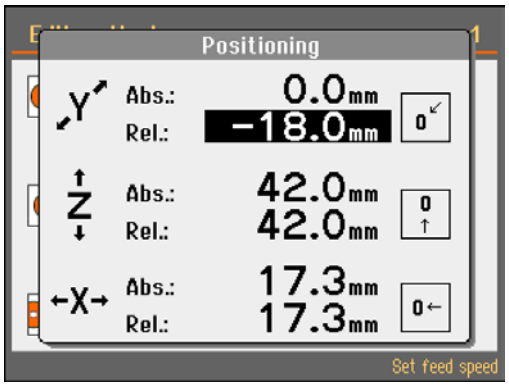
To return to the previously defined zero position:

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

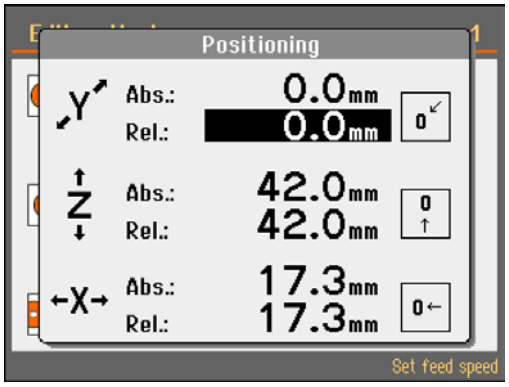


Removing a Relative Zero Position

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



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

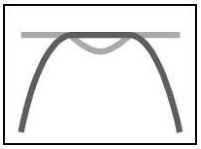


Reference Positions

Magnutom will perform a search for reference positions for every 20th start up.
To perform an additional reference search:

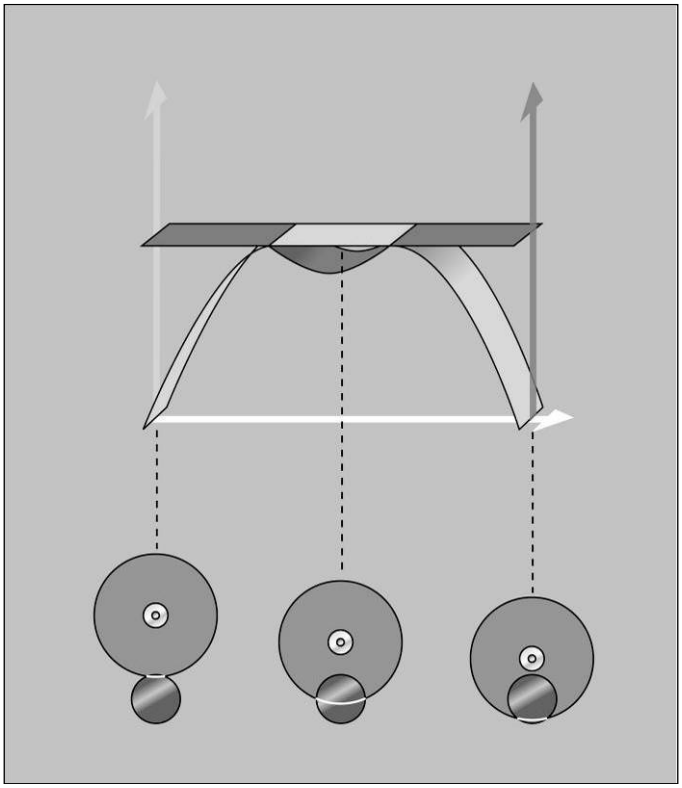
- Switch Magnutom off.
- Press the Emergency STOP button then switch Magnutom on (a message will appear to inform that the Emergency STOP is activated).
- Release the Emergency STOP and a pop-up will appear. Press Enter to start the search for reference positions.

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.

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

3. Accessories

Please refer to the *Magnutom brochure* for details of the range available.

Clamping Tools

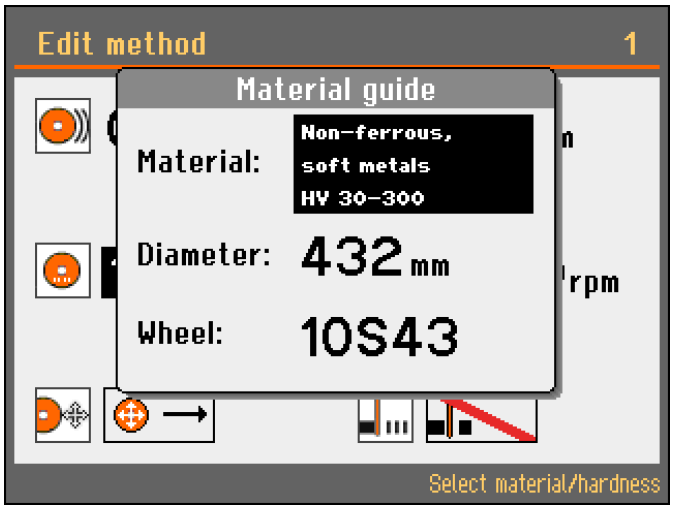
Please refer to the *Struers Clamping Tools brochure* for details of the range available.

4. 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.



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 5 l	 49900045 49900046
Grease for maintenance/lubrication of the spindle	16080802
Oil for maintenance of cutting table	16080845

5. 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 hood.	Leave the protection hood 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.

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 protection hood 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.
AutoStop 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 *Stop position* function.
AxioCut cutting mode is not working.	AxioCut does not function when AutoCut is selected.	Go to the *Process options* menu and set AutoCut to **Off.**

Error Messages

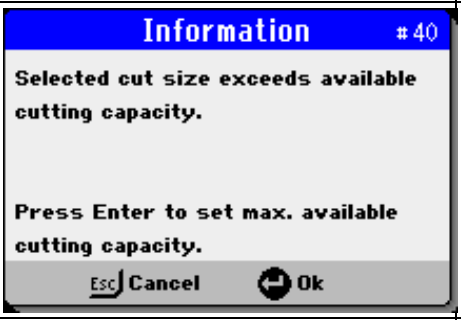
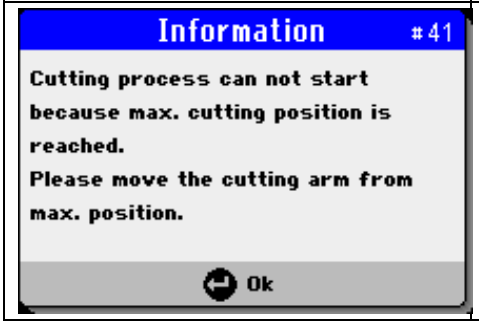
Error messages are divided into two classes:
Messages and Errors

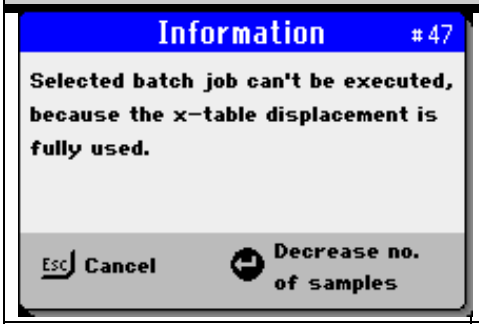
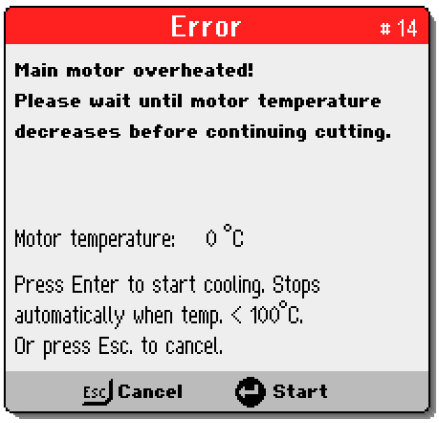
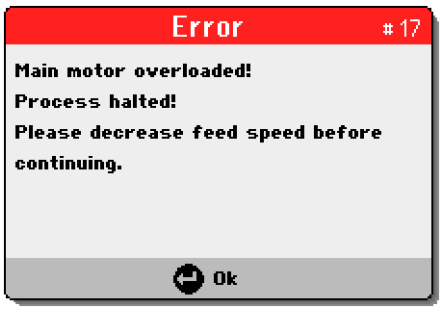
Messages

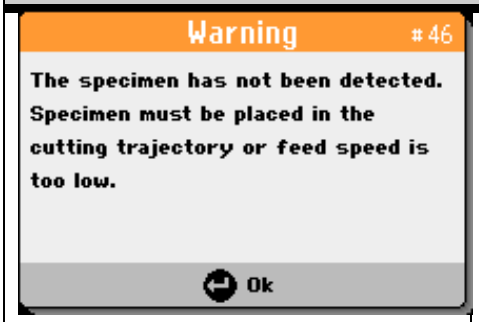
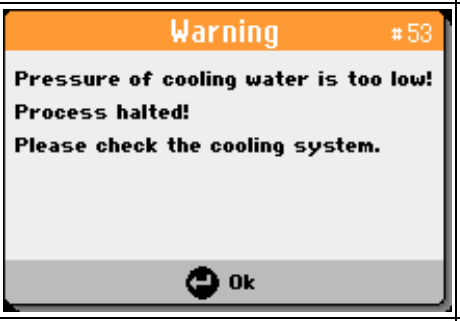
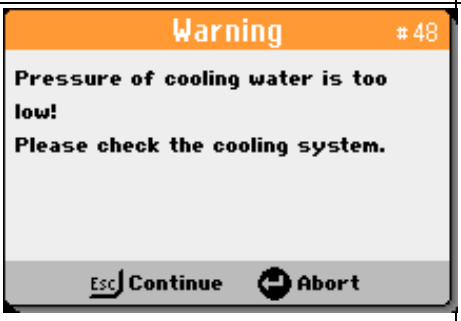
Messages are intended to inform the operator of the machine's progress and advise about minor operational errors.

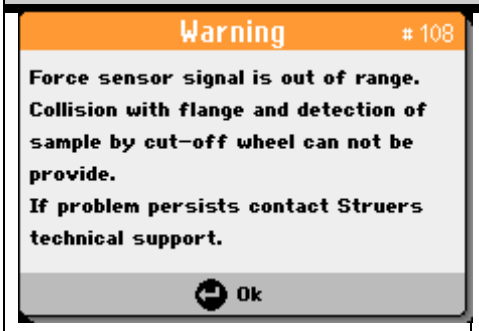
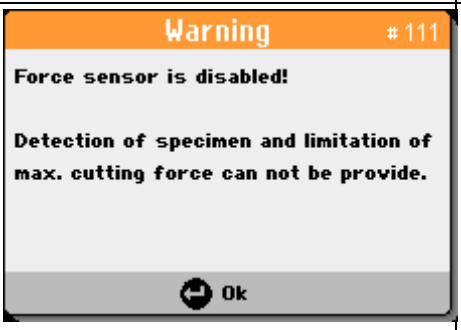
Errors

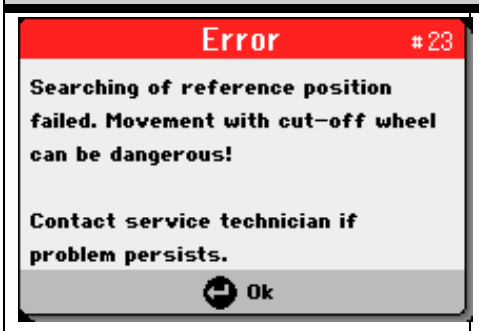
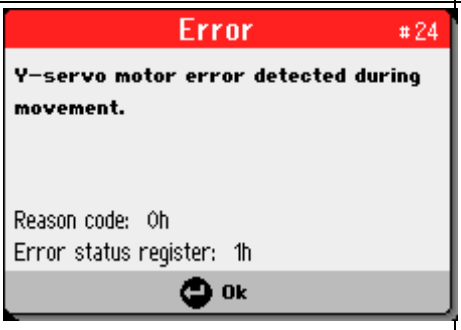
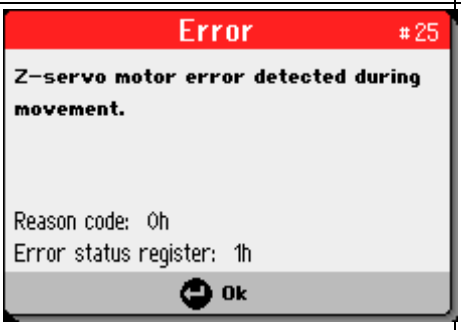
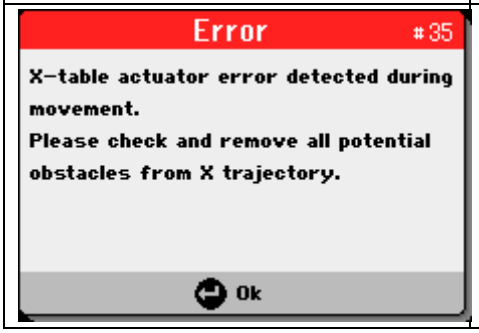
Errors must be rectified before cutting can be continued.

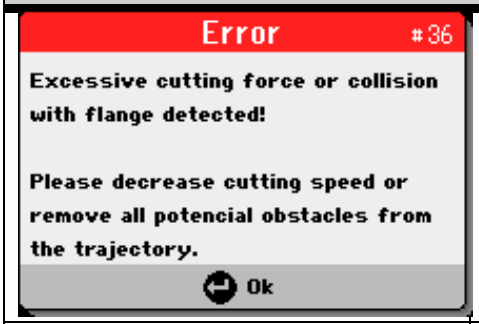
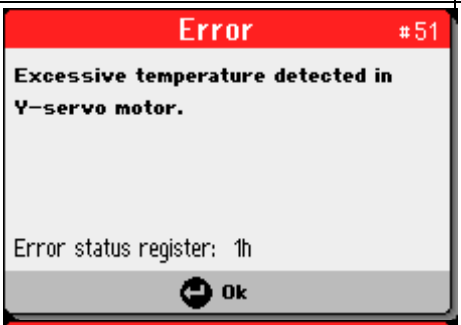
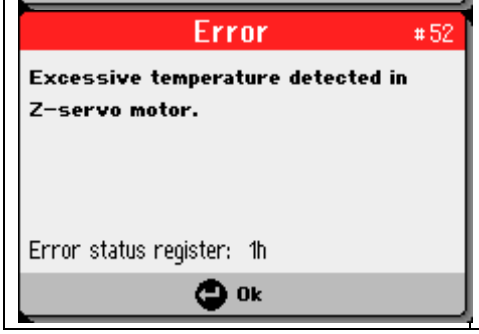
Message	Explanation	Action
#4		Move X-table to increase the distance between the positions.
#5		Change to another Cutting Mode.
 #40	The selected cut size is not possible due to the current position of cut-off wheel.	Press **ENTER** to set cut size to the maximum available or press Esc to return to the 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
	#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.
	#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
	#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.
	#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 *Reason code* and *Error status register* displayed on Magnutom.
	#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 *Reason code* and *Error status register* displayed on Magnutom.
	#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.

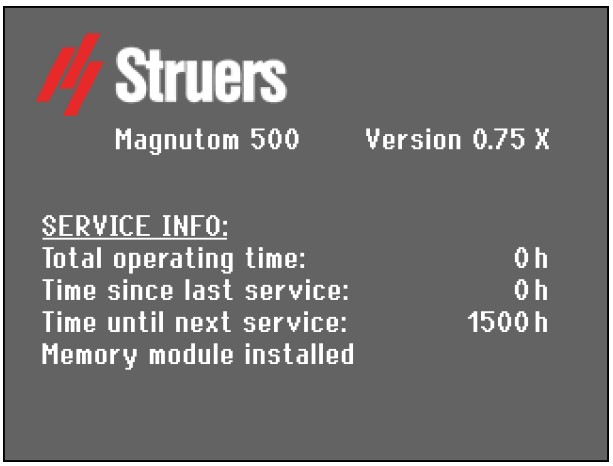
Error		Explanation	Action
	#36	Excessive force is detected during a cutting process. This can happen if flange or cut-off wheel guard collides with a cutting sample.	Remove any obstacles from cutting direction then press **ENTER** to clear the error.
 	#51 #52	An over temperature (> 73°C) is detected 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.

6. 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.

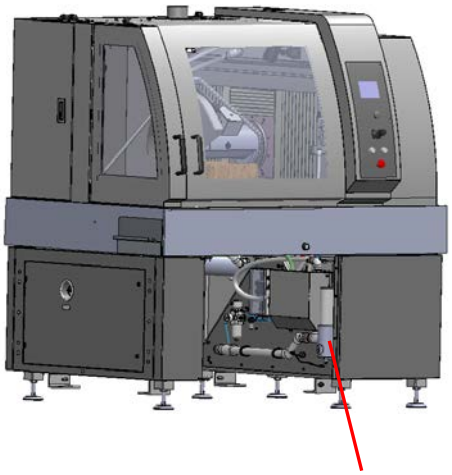
Information on total operation time and servicing of the machine is displayed on the screen at start-up:



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.



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.

7. 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** (ref. EN 50178 / 5.2.11.1).

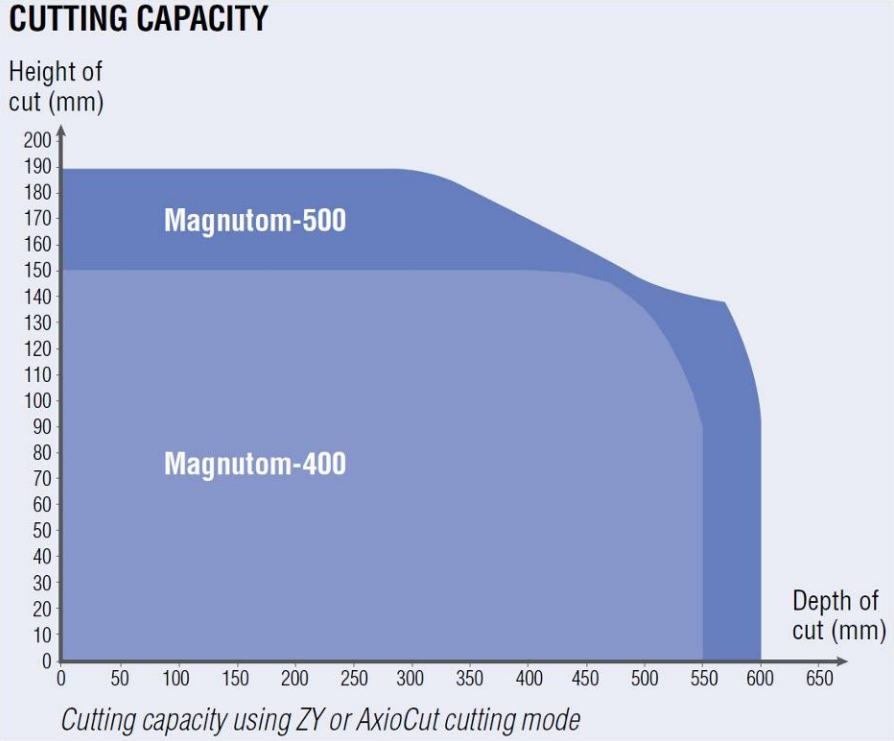
Electrical Installations without RCCB
The equipment must be protected by an insulation transformer (double-wound transformer).

Important:
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	0-95% RH non condensing

Cutting Capacity



Cutting capacity using ZY or AxioCut cutting mode

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 protection hood.
- 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.

English

Declaration of Conformity

Manufacturer

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

Herewith declares that

Name:	Magnutom-400/-500
Cat. No.:	06276146, 06276246 / 06146146, 06146246
Function:	Cut-off machine
Type No.:	627 / 614

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:

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Date of Issue: 2017.10.05

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Pederstrupvej 84
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Denmark

Magnutom

Spare Parts and Diagrams

Manual No.: 16147001
Revision A

Date of Release 2018.01.16

colour inside

Always state *Serial No* and *Voltage/frequency*
if you have technical questions or when ordering spare parts.

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

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Spare Parts and Diagrams

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Some of the drawings may contain position numbers
not used in connection with this manual.

The following is a list of the spare parts that may need replacement during the lifetime of the equipment.

To check the availability of other replacement parts, please contact your local Struers Service Technician. It may help identify the part by referral to its position number on the assembly drawings included in this manual.

	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
16140006		**Magnutom-500 XT, complete**		
	30	Seal, assembled		16140088
	200	Spindle Housing Sealing		16140319
	210	Protection Stop		16140384
16140015		**Base with both movements**		
	110	MotorAM132M/A4B53x400VD/50Hz16	M1	2ME13211
	200	Shaft Ring SD_45x55x4		2IS30045
	210	Shaft Ring SD_50x62x5, 4 pcs		2IS30055
16140018		**Base with Y movement**		
	80	Buffer, 2 pcs		16140389
	90	Buffer, 4 pcs		16140413
	120	Caged Ball LM Guide THK, 2 pcs		2BF41076
	140	Coupling Rotex GS28,d22-d25,64		2JH02864
	150	Gearbox i=5 Technoingranaggi		2MG40070
	160	Servomotor JVL MAC800-D2,230V	M2	2MM51755
	450	MAC00-FC41 Communication module		2PA00400
16140019		**Base with legs and drain**		
	50	Cutting table plate long		16140352
	60	Cutting table plate Short 22 pcs.		16140340
	220	O-ring 72 NBR 872. 28.00-2.00		2IO20057
	250	Nut M20 A2 DIN934, 6 pcs		2TA10200
	350	GEKA coupling 3/4 int. thread		2NF60002
16140010		**Magnutom complete**		
	210	Ball guide WSQ-16		2BF27416
16140020		**Ball Screw Complete, Y-movement**		

	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
	10	Spindle, Y-movement		16140150
16140021		**Ball Screw Complete, Z-movement**		
	10	Spindle, Z-movement		16140156
	50	Ball screw housing Hiwin BK-30		2BS00031
16140022		**Servomotor Base Z-movement, assy**		
	30	Gearbox APEX i=5PE090-005_JVL		2MG40901
	50	Coupling Rotex GS28,d22-d25,64		2JH02864
	80	Bearing Spherical SKF GE_30_C		2BK20030
	90	Servomotor JVL MAC800-D5,230V, (1 pc)	M3	2MM51756
	100	MAC00-FC41 Communication module		2PA00400
16140023		**Motor Base, assembled**		
	50	Bearing Spherical SKF GE_30_C, 5 pcs		2BK20030
	90	Nut Housing, 3 pcs		16140209
16140024		**Lubrication Manifold, assembled**		
	20	Grease Nipple M8x1 Zn, 6 pcs		2GN01011
16140030		**Spindle, Assembled**		
	80	Outer Flange		16140314
	90	Fixed Flange		16140316
	150	Inner Ring, machined		16140324
	160	RetainingRingForBoreJ85DIN472, 2 pcs		2ZL20850
	170	Rad. shaft Seal SKF CR45x85x10, 3 pcs		2IS10050
	190	Nut M24 DIN934 A2 Left hand		2TA70240
	220	O-ring 40x2 NBR 60, 4 pcs		2IO20074
	230	SphericalRollerBear.SKF22209E, 4 pcs		2BK20045
	240	Coupling Rotex 65,d38-d38,64Sh, 2 pcs		2JH06564
	270	V-ring VA65		2IV10065
	320	Oil-MOGUL LK32, 2 pcs (140 ml)		2LS00033
	360	SightWindowGN743.4-11-M16x1.5B		2NG17434
	380	Shaft Seal REINZ 81-26392-10		2IP22457
16140031		**Wheel Guard, Assembled**		
	40	Hose PVC w. steel coil ø12/ø18		2NU21218
	50	Hose PVC w. steel coil d18-d25		2NU21226

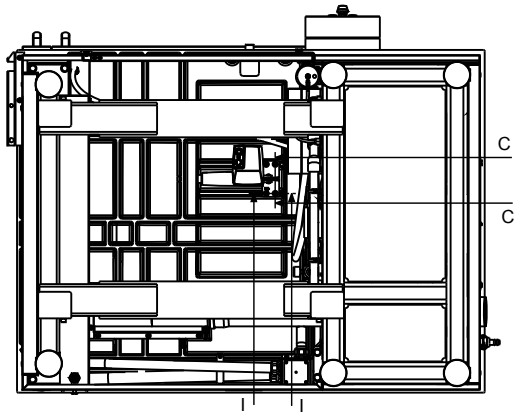
	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
	60	Snap-lock tube, assembly		16140033
	80	Spray nozzle TP14 120 316 PP.		2YD20004
	100	Ballofix valve ½-½in		2YH10603
16140033		**Snap-lock tube, assembly**		
	10	Hose SNAP-LOC. Complete		2NU90001
	20	14 guiding elements. SNAP-LOC, 2 pcs		2NU90002
16140036		**Cutting Table f. X-table**		
	30	Cutting table plate long		16140352
	190	Wire set for X-table		16143593
16140037 + + 16140042 + 16140043		**Left Net, assembled + Right Net, assembled + Perforated sheet, assembled**		
	20	Handle GN 565-20-100-SW		2GH22665
16140040		**Side door, assembled**		
	20	PETG Window Pane for side door		16140556
	50	Handle E+G M.643-200-B-M8		2GH00007
	120	Hinge GN 237-NI-50-50-A		2GG23750
16140041		**Side door bottom labyrinth, assy**		
	40	Sealing strip Black 3x15 4030, 2 pcs		2IP00302
	50	Sealing strip Black 3x15 4030		2IP00302
16140045		**Front door, assembled**		
	90	Support for window		16140573
	120	Roll with bearing ZABI R- 44		2BK50044
	210	Rubber stop		2GB00015
	330	Straight Actuator AZM161-B6, 2 pcs		2SS01616
16140050		**Chamber Bellows, assembled**		
	20	Bellows Hestego-Horizontal		16140535
	30	Bellows Hestego-Vertical Rear, 2 pcs		16140534
	40	Bellows Hestego-Vertical Front		16140533
	100	Roll with bearing ZABI R-33, 4 pcs		2BK50033
	130	Roll with bearing ZABI R-25, 4 pcs		2BK50026

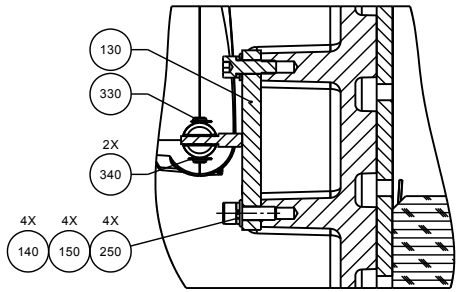
	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
16140051		**Shield Capsule,Assembled**		
	70	Roll with bearing ZABI R- 44		2BK50044
	80	V-ring VA200, 4 pcs		2IV10200
16140053		**Upper Profile, Bellows, assemble**		
16140013	70	Sealing rubber for Gap		16140736
16140013	120	Seal. Rubber for Front Panel Gap		16140735
16140012	170	Cam, Southco E5-6014		2GL35583
16140012	190	Sliding bearing GFM-081017-15		2BG01715
16140012	360	HT tube dia. 110		2NP00100
16140058		**Sample barrier Left, assembled**		
	290	Wire set for X-table		16143593
16140061 + 16140062		**Protection Shield 1,assembled** **Protection Shield 2,assembled**		
	40	Profile Gumex 0536013		2IP01065
16140070		**Control Panel, assembly**		
	100	USB protective with link		2IB00105
16140071		**Front panel, assembly**		
	30	PCB MultiPurpose,, Tested + Bootload.	A4	16013000
	40	Turn - Push Button		15090600
	50	Foil, Magnutom-500	SB2	16140725
	70	PCB for SMM, Tested		15483004
	110	Cap,PushButt.transp.5.5200.102		2SA30102
	130	Emergency stop ø22 type RV		2SA10400
	160	Turn/pushEncoderW.cable6inch24	BR1	2HR12413
	180	Joystick 3 axis HFX-36P01	SQ1	2RQ00036
	210	Push butt. Head RVAT DG Stainl.		2SA00400
	220	Module holder. 3 elem. MHR-3, 2 pcs		2SA41603
	250	Display 320x240 TFT-color, LED	A5	2HD50200
	330	Display Flat Cable, 40p, 210mm		2WF01150
16140075		**HW box and parts, assembly**		
	80	Hinge RT26-6		2GG02606

	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
	90	Filter A1000-FIV3050-SE, (1 pc)	Z1	2MO93050
	100	Brake resistor CBV405-20R	R1	2RK05605
	110	AC reactor AX-RAI00360500-DE	L1	2MO60500
	120	Inverter V1000 VZA4015FAA	A1	2PU12050
	130	DC Link Reactor AX-RC01750430-DE	L2	2MO50430
	140	On/Off Switch 3x80A KG80	QS1	2SE20321
	150	Power Supply 88-264V, 24V/10A	A2	2PA90240
	160	Autotransformer ASUL120C	TM1	2MT12085
	180	Contactor J7KNA-AR-22-24D	K3+K4	2KM70900
	220	Standalone Safety Controller, (1 pc)	A3	2KS10010
	230	Omron J7KNG-14-01-24D Contactor	K5+K6	2KM71411
	260	Circuit breaker J7MN-3P-1E6, (1 pc)	FT1	2KM71805
	280	Omron J7KNG-10-10-24D contactor, (1pc)	K2	2KM71410
	290	Omron J7KNG-40-24D contactor	K1	2KM74010
	300	Solid state relay G3RV- SL500- D AC/DC24	KL1+KL2	2KL50024
	310	Lock Southco E3-55-85, 2 pcs		2GL35585
	530	4.0 AT Cl.-CC fuse 10x38 CSA, (2pcs)	F1+F2	2FC11040
	540	6.0 AT Cl.-CC fuse 10x38 CSA, (1pc)	F3	2FC11060
	620	Noise filter FN2412H-8-44	Z2	2MO12844
16140077		**X-table Connection Box**		
	190	3.5A 150V BYV28-150 FAST RECT., (3pcs)	VD1-VD3	2VD35028
16140088		**Seal, assembled**		
	20	Simmer ring SD 30x40x4		2IS30030
	30	V-ring V-50A		2IV10050
16140095		**Plate for Valves, Assembled**		
	40	Hose PVC w. steel coil d18-d25		2NU21226
	50	Press. hose. arm. PVC 3/8-ø10, 1 m		2NU29312
	60	Hose PVC w. steel coil ø12/ø18, 1.8 m		2NU21218
	100	Solenoid valve 2/2, 24Vdc, 2 m	Y3	2YM10132
	230	Press. switch 0.5E BAR G¼in MS	BP1	2SP10011
	440	Valve ASCO 287	Y1	2YM10287
16140097		**Water pistol**		
	10	Cleaning Pistol		16140098
	30	Shower hose P04-HV-xxx-06		2NU99012

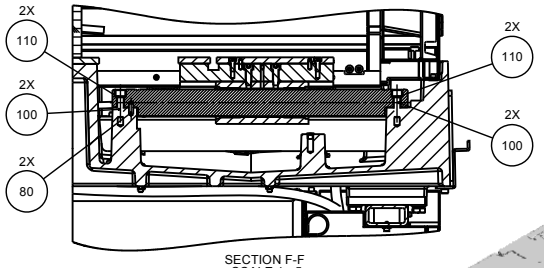
	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
		Loose parts, Magnutom-500		
		Wrench 36		2GR36410
		HT Elbow 110		2NG00110
		Key Southco E3-26-819-15		2GR81915
		Triangular key M5-100mm		2GR00887
		Wire Cut Control, Magnutom, item 16143585		
		Cable W18 Magnutom-500		16143518
		Cable W21 Magnutom-500		16143521
		Cable W22 Magnutom-500		16143522
		Cable W24 Magnutom-500		16143524
		Cable W27 Magnutom-500		16143527
		Cable W29 Magnutom-500		16143529
		Cable W38 Magnutom-500		16143538
		Earth wires Magnutom-500		16143554
		Wire Cut Magnutom, item 16143580		
		Cable W1 Magnutom-500		16143501
		Cable W2 Magnutom-500		16143502
		Cable W3 Magnutom-500		16143503
		Cable W5 Magnutom-500		16143505
		Cable W6 Magnutom-500		16143506
		Cable W7 Magnutom-500		16143507
		Cable W12 Magnutom-500		16143512
		Cable W13 Magnutom-500		16143513
		Cable W14 Magnutom-500		16143514
		Cable W15 Magnutom-500		16143515
		Cable W16 Magnutom-500		16143516
		Cable W25 Magnutom-500		16143525
		Cable W26 Magnutom-500		16143526
		Cable W32 Magnutom-500		16143532
		Cable W33 Magnutom-500		16143533
		Cable W34 Magnutom-500		16143534
		Cable W37 Magnutom-500		16143537
		Cable W39 Magnutom-500		16143539
		Cable W41 Magnutom-500		16143541
		Cable W42 Magnutom-500		16143542

	Spare part list for Magnutom			
Drawing	**Pos.**	**Spare Part**	**Ref.**	**Cat no:**
		Wire Set, item 16143590		
		Cable W4 Magnutom-500		16143504
		Cable W9 Magnutom-500		16143509
		Cable W11 Magnutom-500		16143511
		Contact block 1 NC 1/2. MTO		2SB10071
		Contact block 1 NO 3/4. MTI		2SB10072
		Wire set for X-table, item 16143593		
		Actuator Linak_LA35	M4	2MK70001
		Wire set Control, Magnutom, item 16143595		
		Contact block 1 NC 1/2. MTO		2SB10071
		Contact block 1 NO 3/4. MTI		2SB10072
		Cable W10 Magnutom-500		16143510
		Cable W36 Magnutom-500		16143536
		Lamp HL1 w. plug	HL1	16143556
		Lamp HL2 w. plug	HL2	16143557
		Namur HQ1 w. plug	HQ1	16143558
		Strain Gauge YR1 w. plug	YR1	16143560
		Namur HQ2 w. plug	HQ2	16143562
		AZM 161SK-1212RKED-024, (2pcs)	YS1,YS2	2SS00120

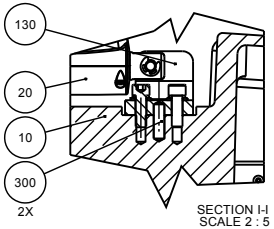




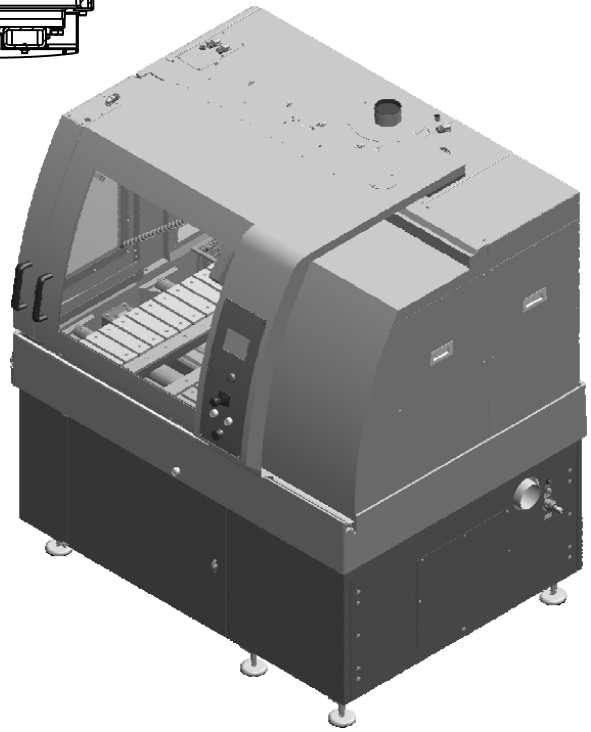
SECTION C-C
SCALE 1 : 2

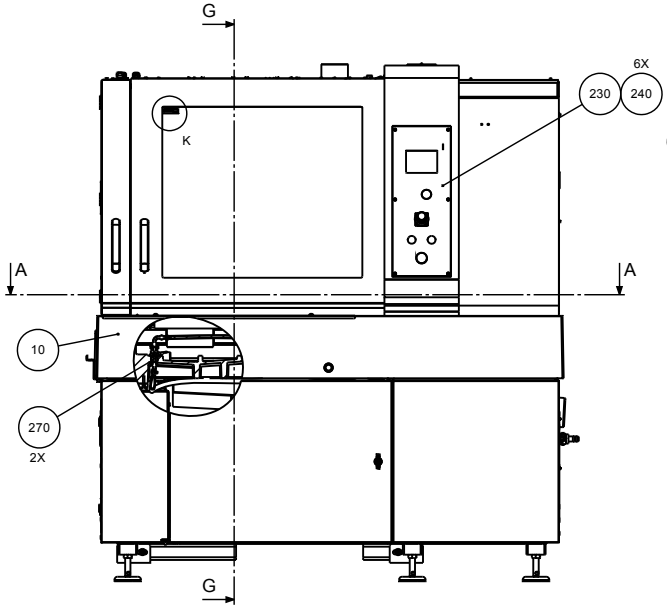


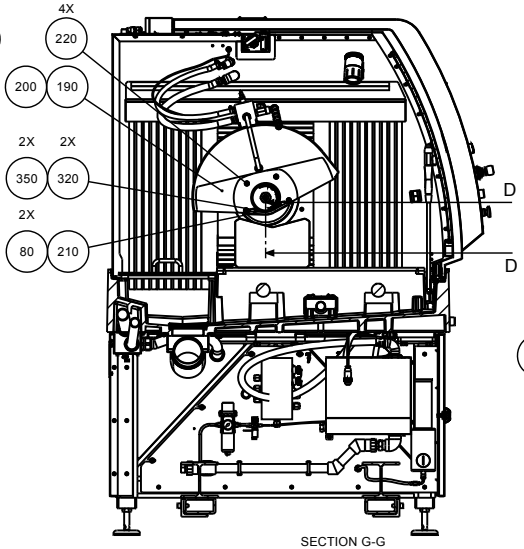
SECTION F-F
SCALE 1 : 5



SECTION I-I
SCALE 2 : 5

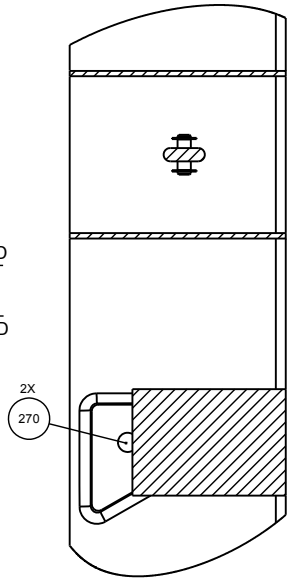


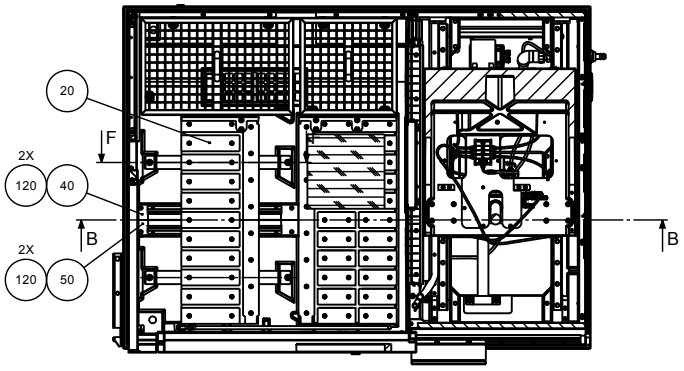




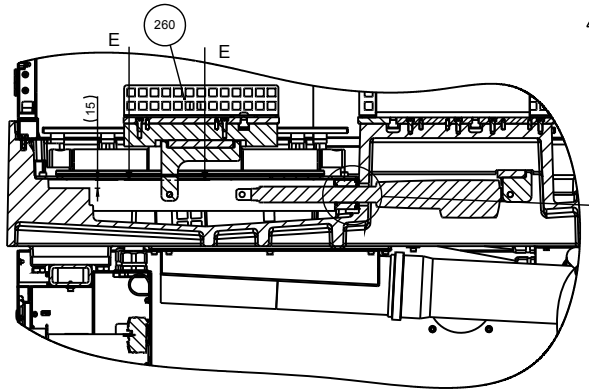
SECTION G-G

SECTION E-E
SCALE 1 : 2

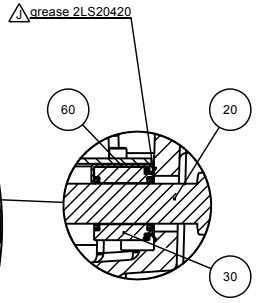




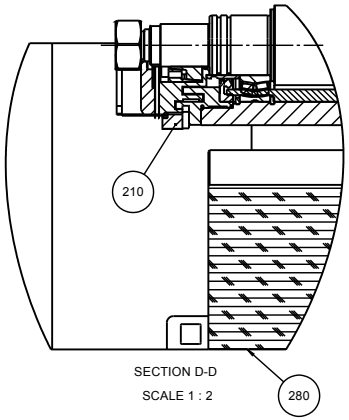
SECTION A-A



SECTION B-B
SCALE 1 : 5



DETAIL J
SCALE 1 : 2



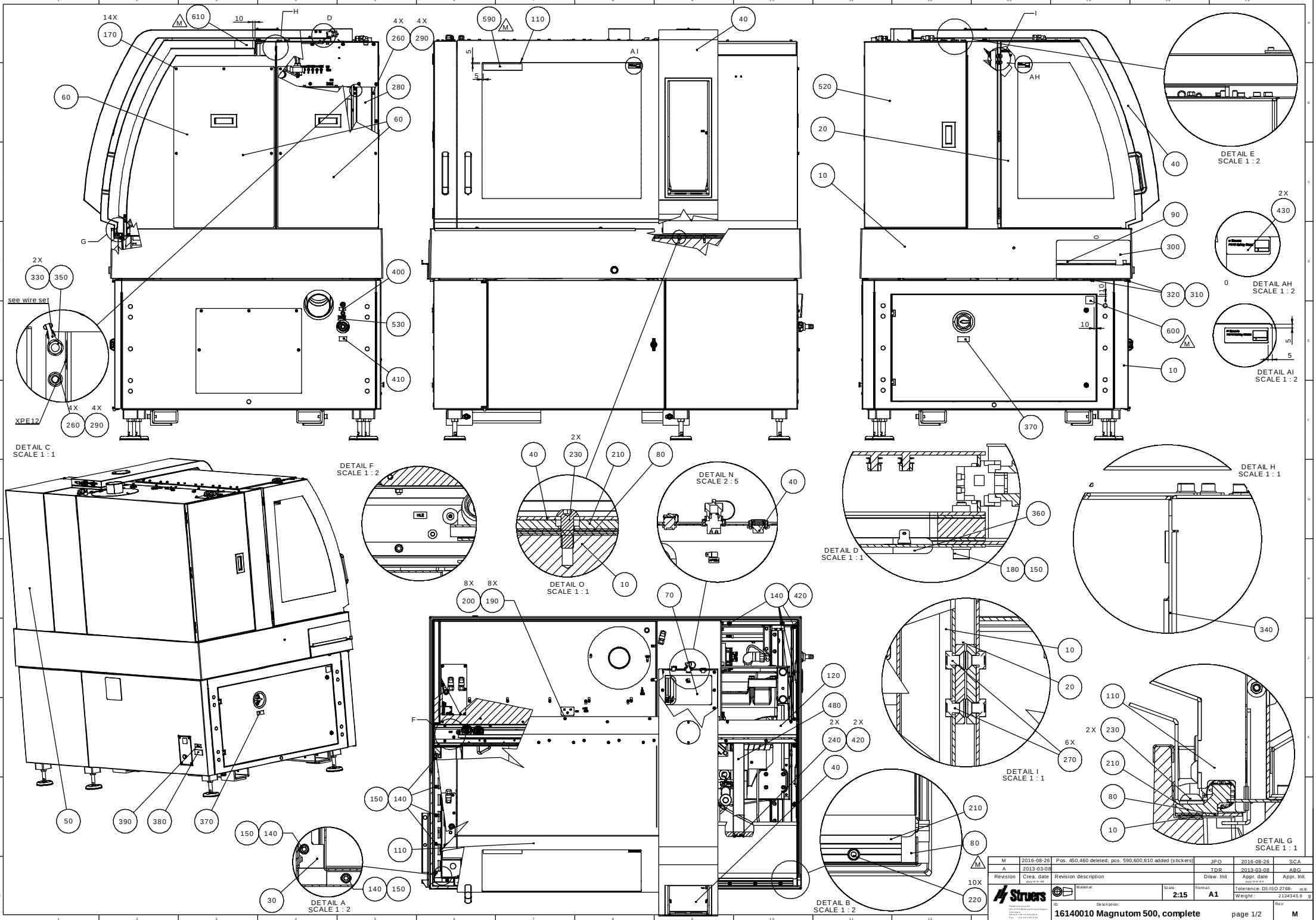
SECTION D-D
SCALE 1 : 2

J	2015-09-24	grease changed	JPO	2015-09-24	SCA
A	2013-03-08		JIF	2013-03-08	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone +45 44 600 800
Fax +45 44 600 801

Material:
Scale: 1:10
Format: A1
Tolerance: DS/ISO 2768-
Weight : 2201978.7 g

ID:
Description: **16140006 Magnutom 500, Automatic table, complete**
Rev: J



M	2016-08-26	Pos. 450,460 deleted; pos. 590,600,610 added (stickers)	JPO	2016-08-26	SCA
A	2013-03-08		TDR	2013-03-08	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Material:

Scale: 2:15

Format: A1

Tolerance: DS/ISO 2768- mK

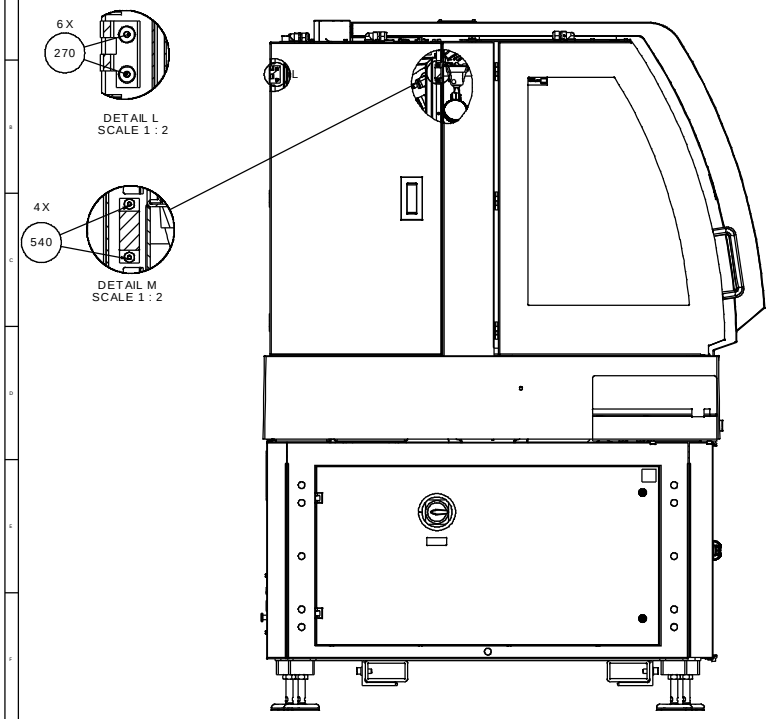
Weight: 2124343.9 g

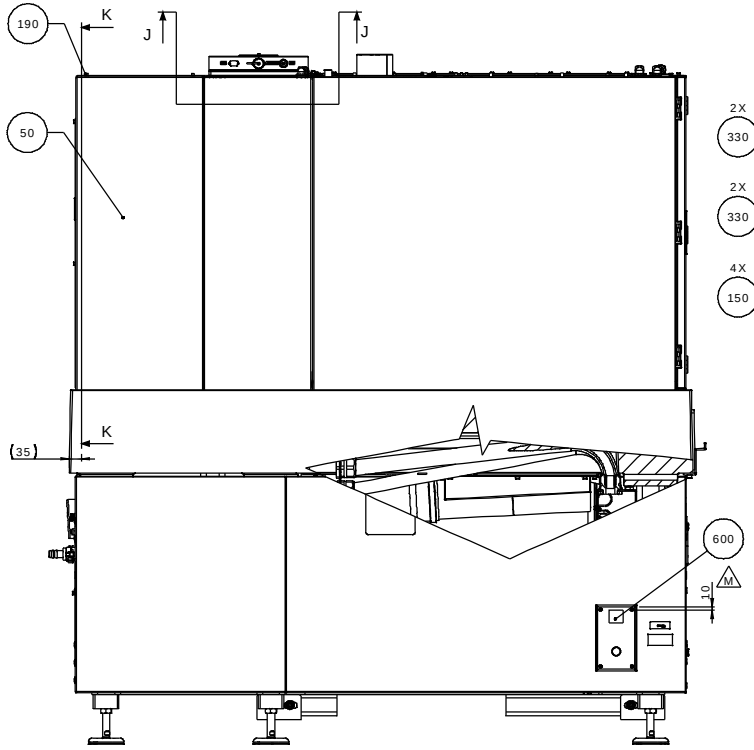
ID:

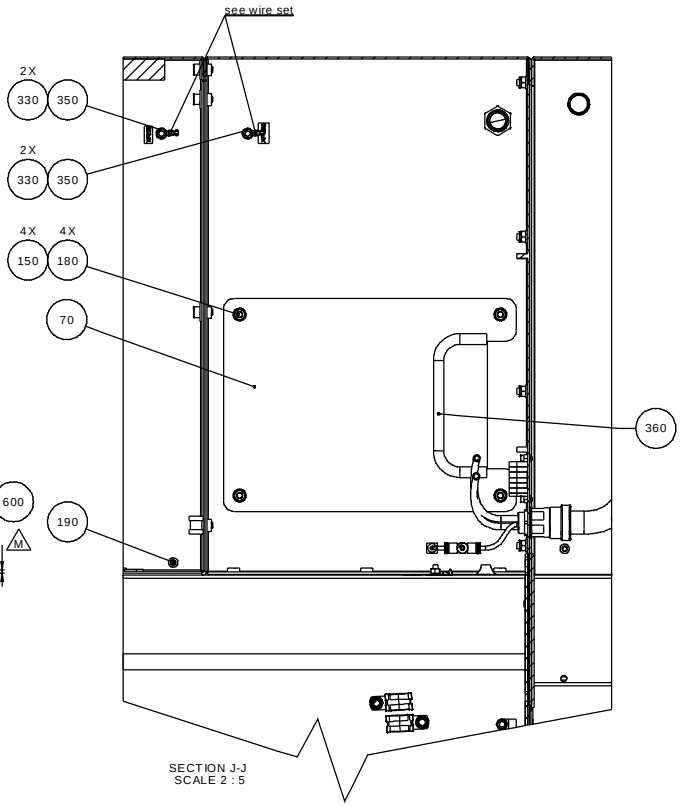
Description: **16140010 Magnutom 500, complete**

page 1/2

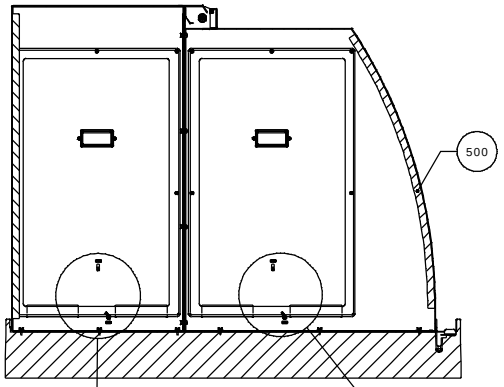
Rev: M



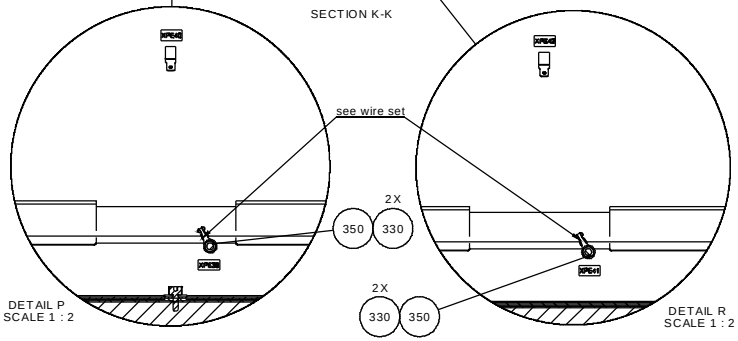




SECTION J-J
SCALE 2 : 5

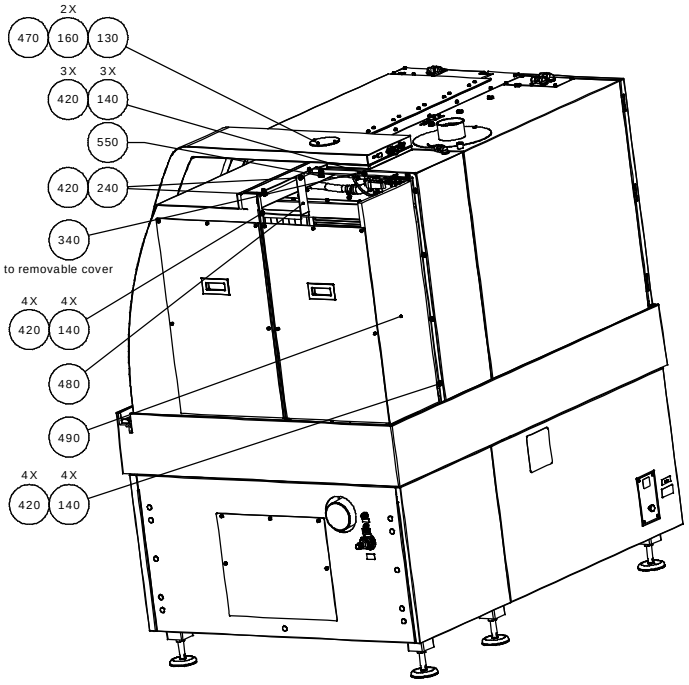


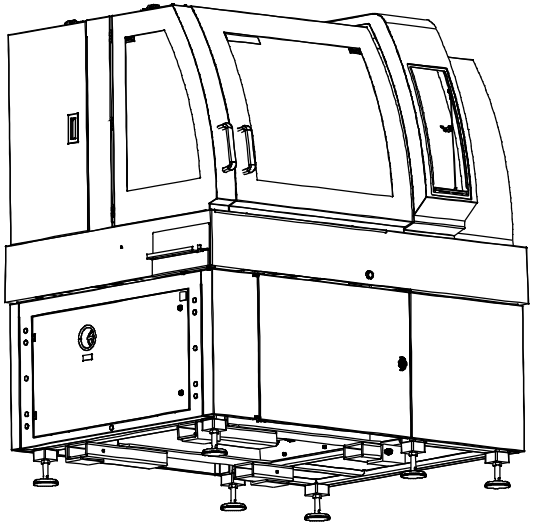
SECTION K-K



DETAIL P
SCALE 1 : 2

DETAIL R
SCALE 1 : 2





M	2016-08-26	Pos. 450,460 deleted; pos. 590,600,610 added (stickers)	JPO	2016-08-26	SCA
A	2013-03-08		TDR	2013-03-08	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Material:

Scale: 2:15

Format: A1

Tolerance: DS/ISO 2768- mK

Weight : 2124343.9 g

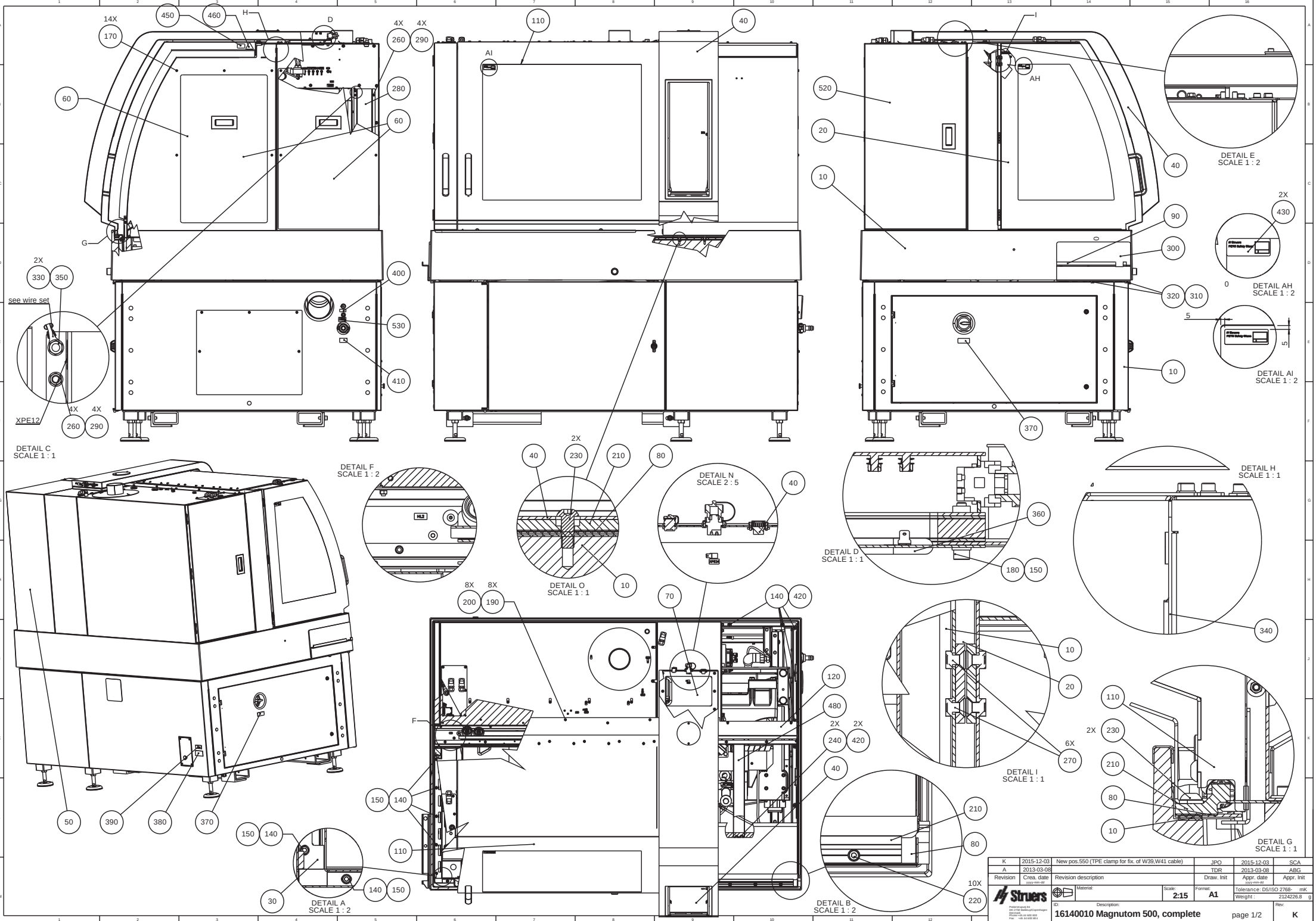
ID:

Description:

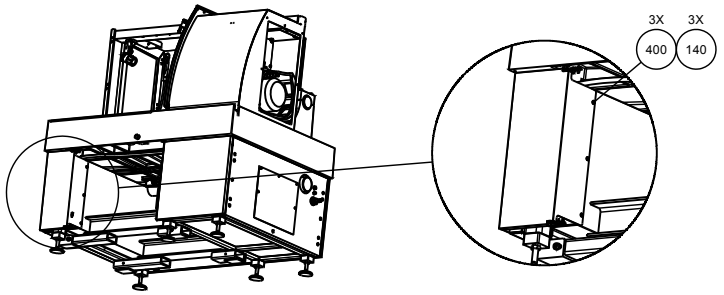
16140010 Magnutom 500, complete

page 2/2

Rev: M

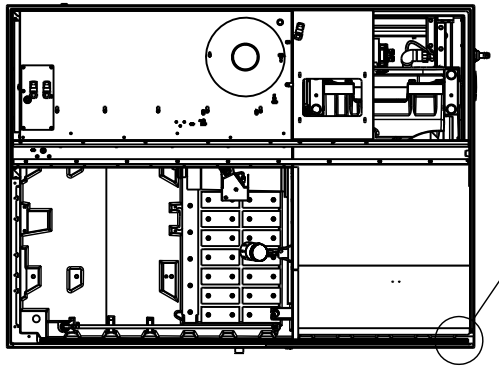


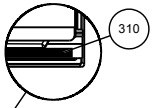
K	2015-12-03	New pos.550 (TPE clamp for fix. of W39,W41 cable)		JPO	2015-12-03	SCA
A	2013-03-08			TDR	2013-03-08	ABG
Revision	Crea. date yyyy-mm-dd	Revision description		Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
Struers		Material:	Scale: 2:15	Format: A1	Tolerance: DS/ISO 2768- mK	
					Weight : 2124226.8 g	
		ID:	Description: 16140010 Magnutom 500, complete		page 1/2	Rev: K



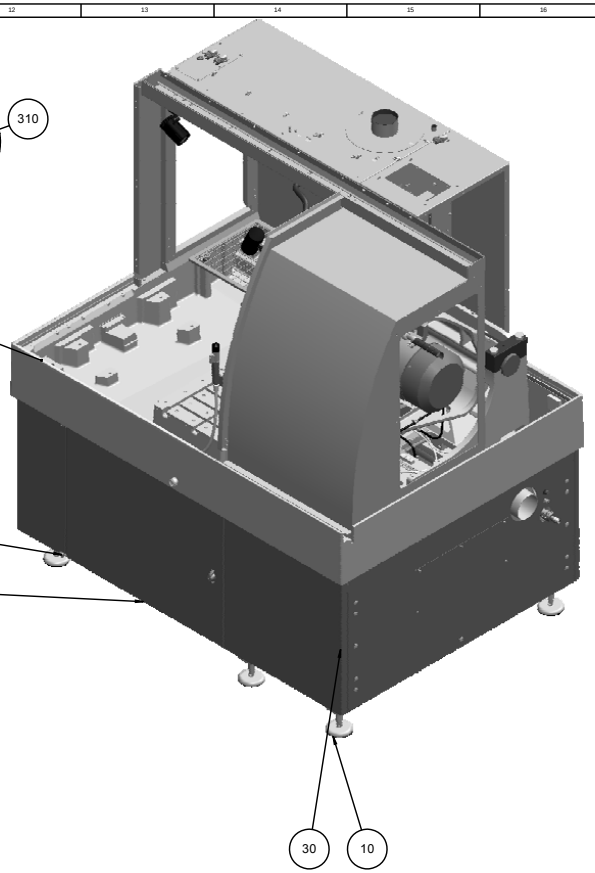
SCALE 1 : 20

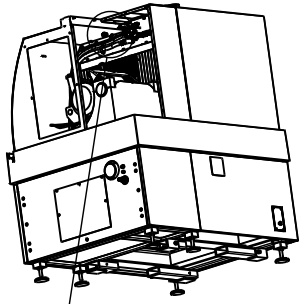
DETAIL N



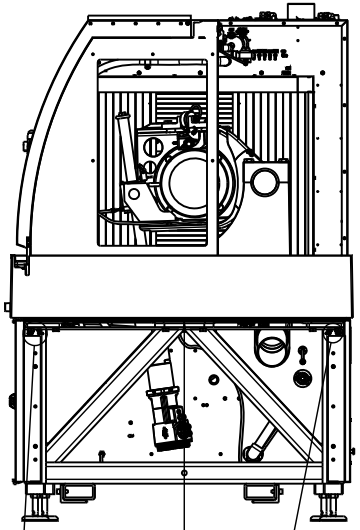


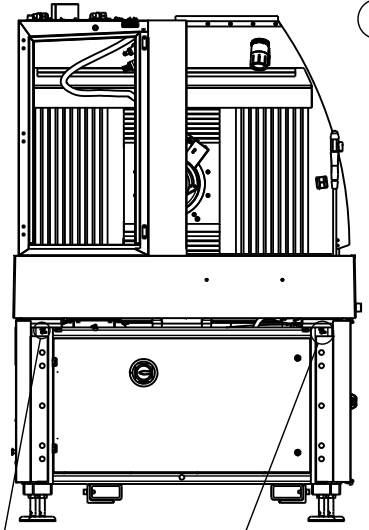
DETAIL R
SCALE 1 : 5

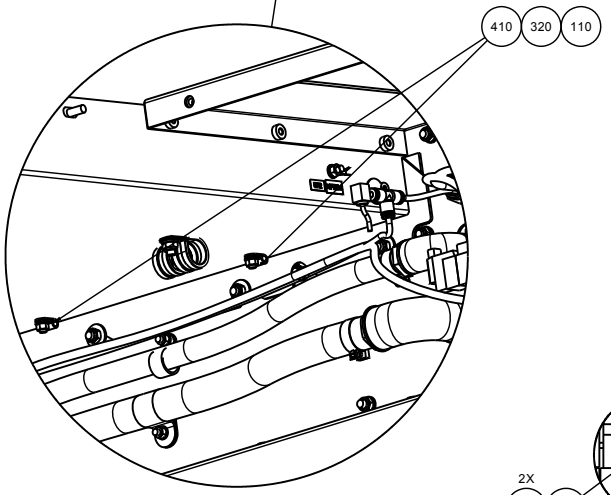




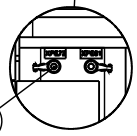
SCALE 1 : 20



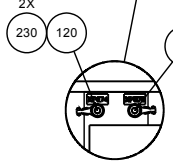




DETAIL O
SCALE 1 : 2

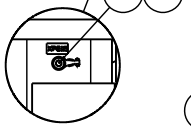


DETAIL M
SCALE 1 : 2

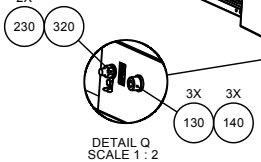


DETAIL N
SCALE 1 : 2

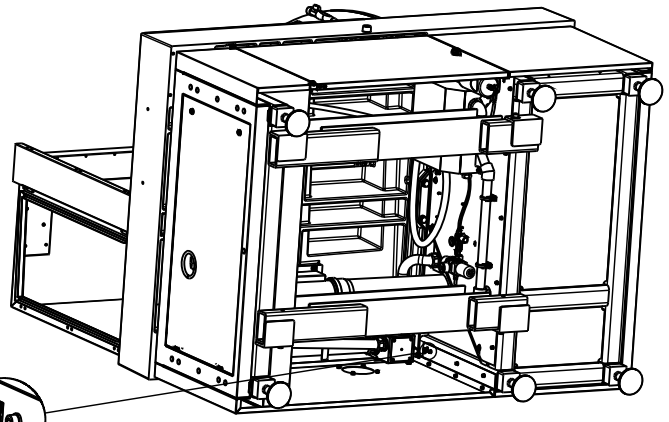
DETAIL O
SCALE 1 : 2



DETAIL P
SCALE 1 : 2



DETAIL Q
SCALE 1 : 2

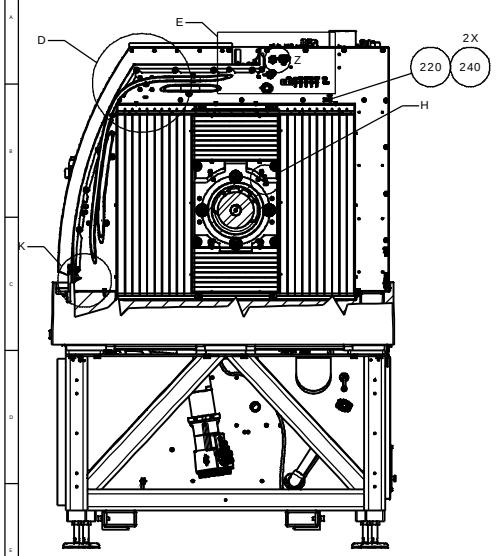


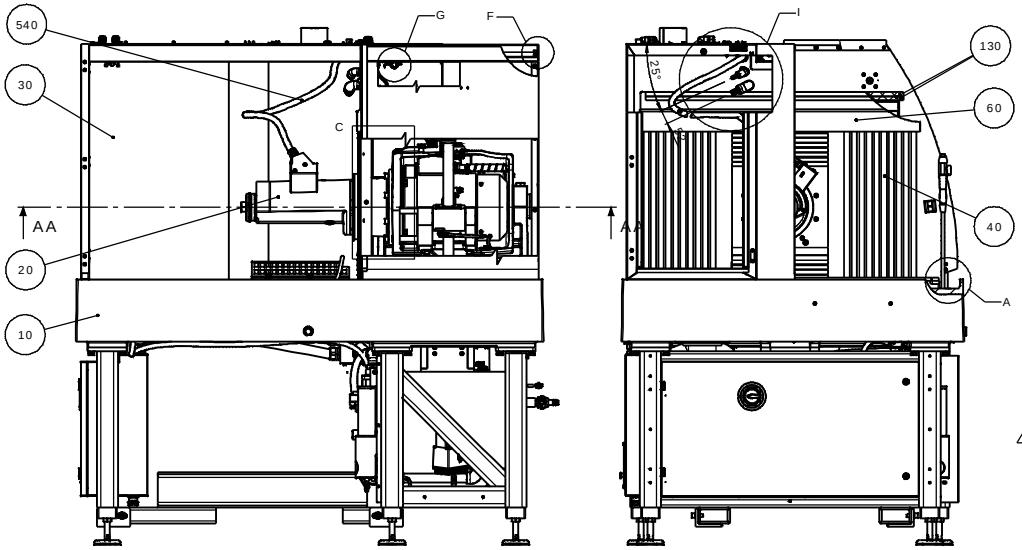
I	2016-01-21	pos. 420-440 removed, change quant. pos. 110,320	JPO	2016-01-21	SCA
A	2013-03-10		LDU	2013-03-10	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

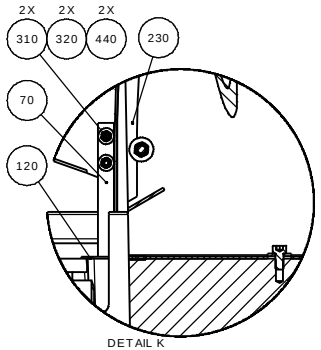
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 80 0

Material:	Scale: 1:10	Format: A1	Tolerance: DS/ISO 2768- mK	
			Weight : 1996297.2 g	

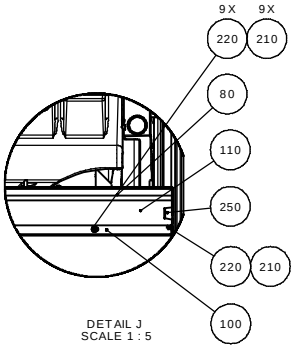
ID:
Description: **16140012 Base with Bottom covers**
Rev: I



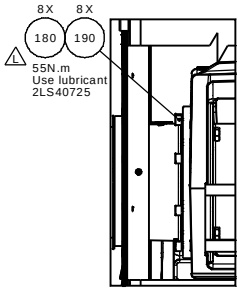




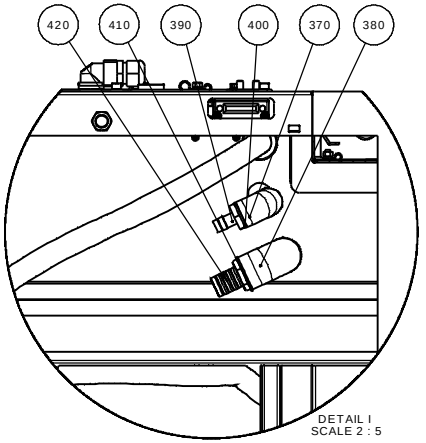
DETAIL K
SCALE 1 : 2



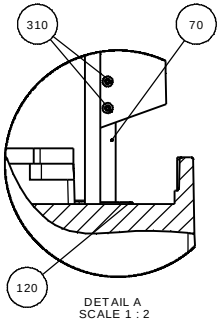
DETAIL J
SCALE 1 : 5



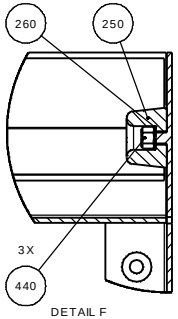
DETAIL C
SCALE 1 : 5



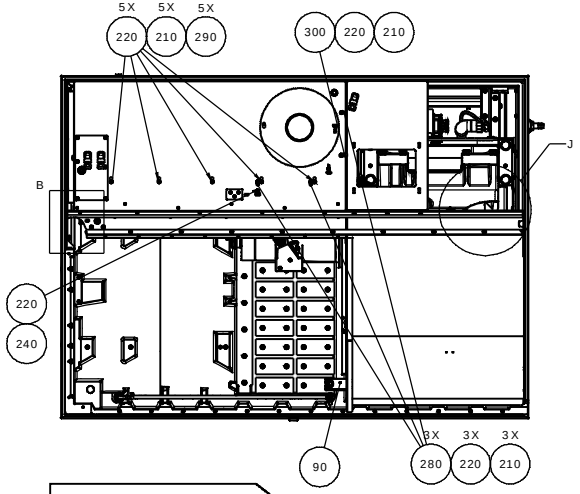
DETAIL I
SCALE 2 : 5

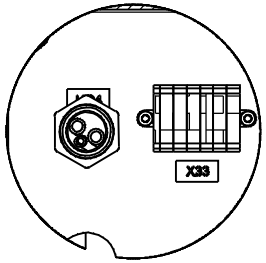


DETAIL A
SCALE 1 : 2

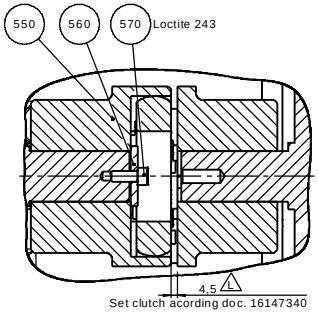


DETAIL F
SCALE 1 : 1

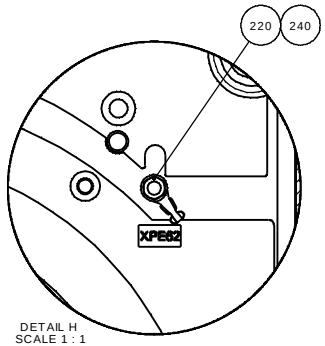




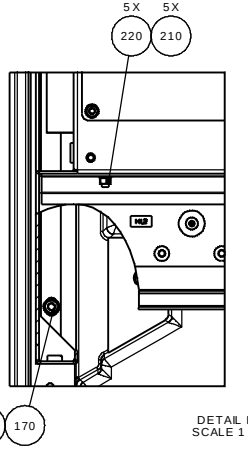
DETAIL Z
SCALE 1 : 1



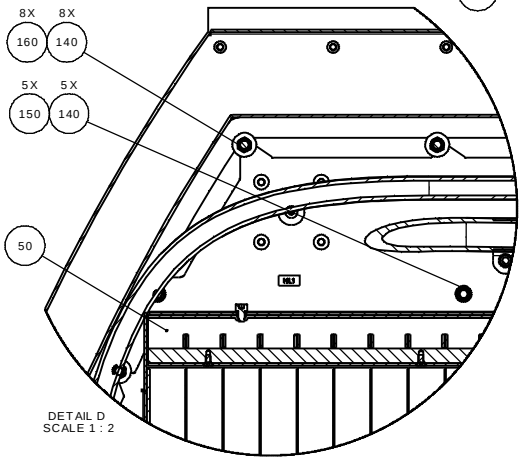
SECTION AA-AA
SCALE 1 : 2



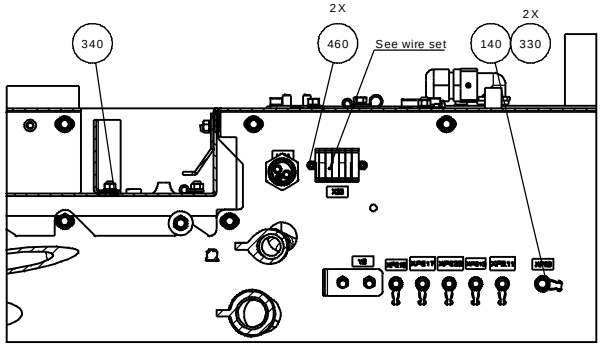
DETAIL H
SCALE 1 : 1



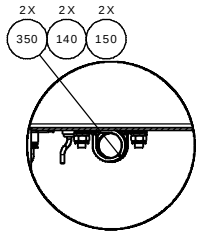
DETAIL B
SCALE 1 : 2



DETAIL D
SCALE 1 : 2



DETAIL E
SCALE 1 : 2



DETAIL G
SCALE 1 : 2

L	2017-02-16	torque of pos. 190 defined, clutch setting specified	JPO	2017-02-16	SCA
A	2013-05-29		TDR	2013-05-29	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Material:

Scale: 1:10

Format: A1

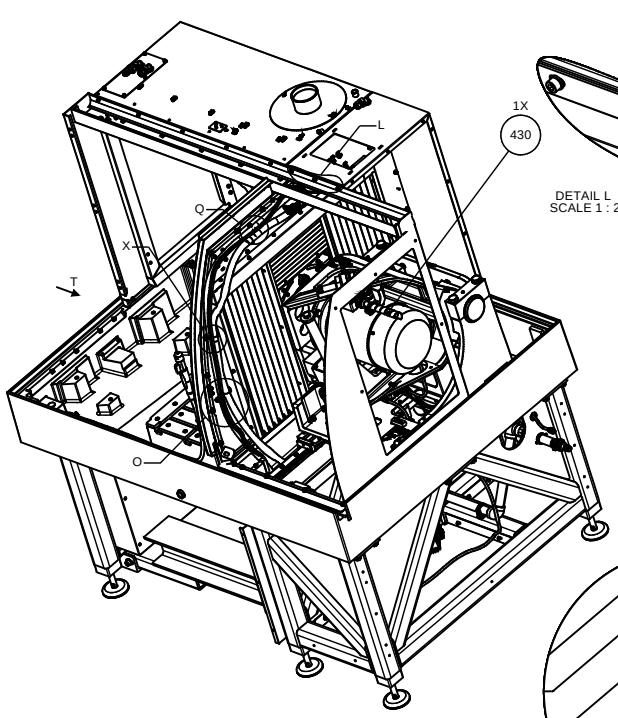
Tolerance: DS/ISO 2768- mK

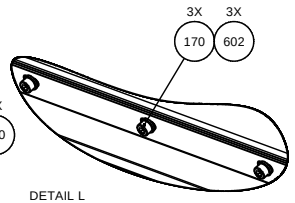
Weight : g

ID:

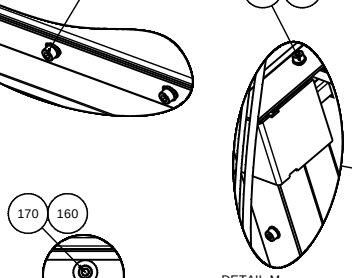
Description: **16140013 Base with Cutting chamber** Page 1/2

Rev: L

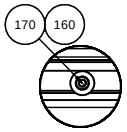




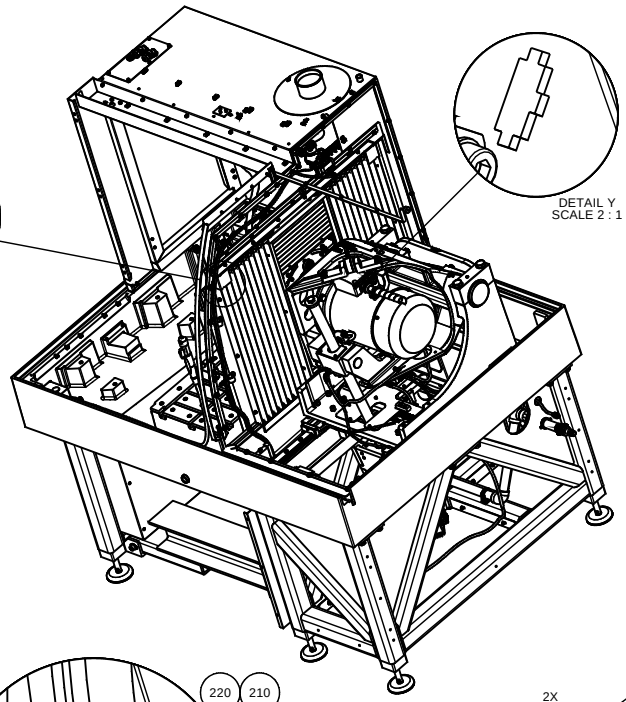
DETAIL L
SCALE 1 : 2



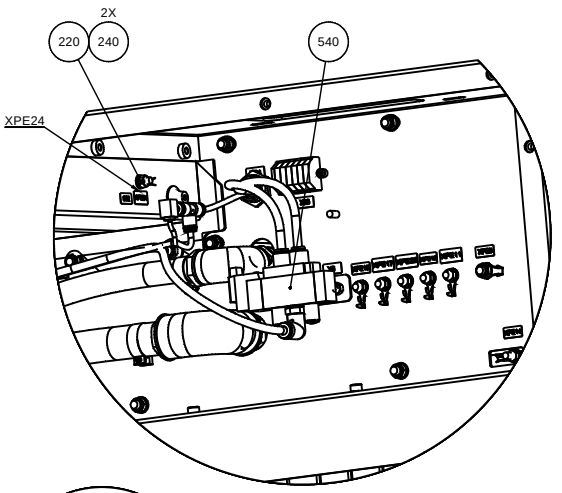
DETAIL M
SCALE 1 : 2



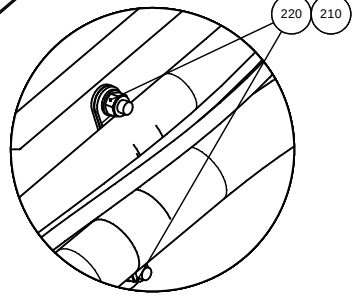
DETAIL N
SCALE 1 : 2



DETAIL Y
SCALE 2 : 1



SCALE 1 : 2



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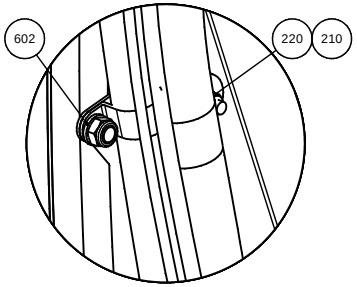
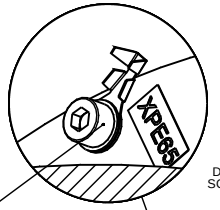
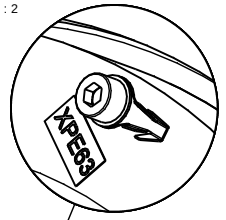
SCALE 1 : 1



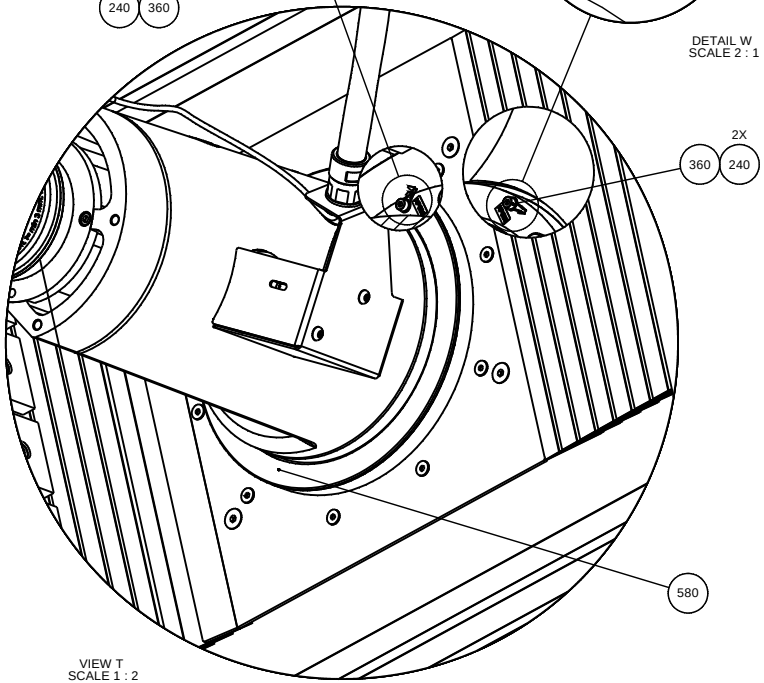
DETAIL X
SCALE 1 : 1



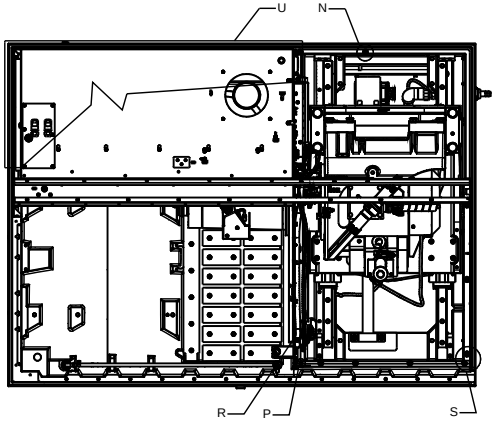
DETAIL V
SCALE 2 : 1

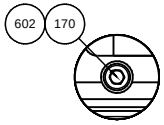


DETAIL W
SCALE 2 : 1

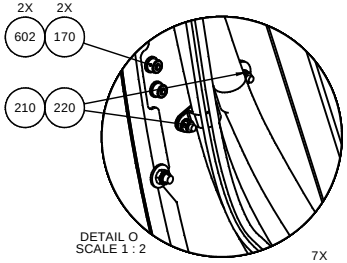


VIEW T
SCALE 1 : 2

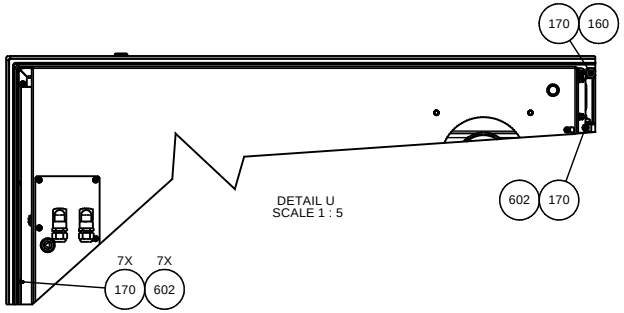




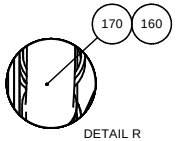
DETAIL P
SCALE 1 : 1



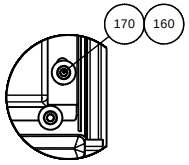
DETAIL O
SCALE 1 : 2



DETAIL U
SCALE 1 : 5



DETAIL R
SCALE 1 : 1



DETAIL S
SCALE 1 : 2

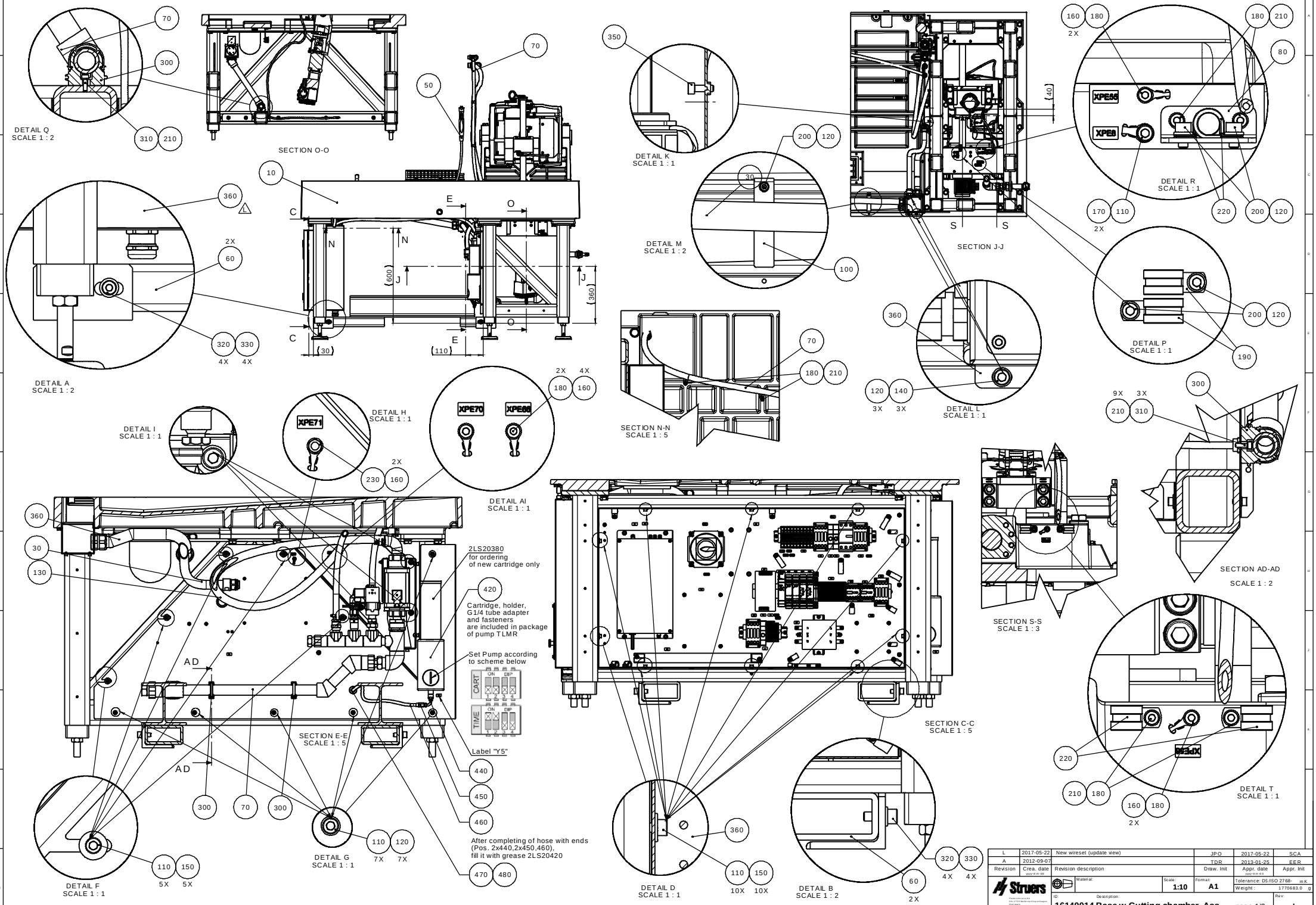
590 600 Are used for cable bundle fixation

L	2017-02-16	torque of pos. 190 defined, clutch setting specified	JPO	2017-02-16	SCA
A	2013-05-29		TDR	2013-05-29	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone+ 45 44 600 800
Fax +45 44 600 801

Material:
Scale: 1:10
Format: A1
Tolerance: DS/ISO 2768- mK
Weight : g

ID:
Description: 16140013 Base with Cutting chamber
Page 2/2
Rev: L



L	2017-05-22	New wireset (update view)	JPO	2017-05-22	SCA
A	2012-09-07		TDR	2013-01-25	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Material:

Scale: 1:10

Format: A1

Tolerance: DS/ISO 2768- mK

Weight: 1770683.0 g

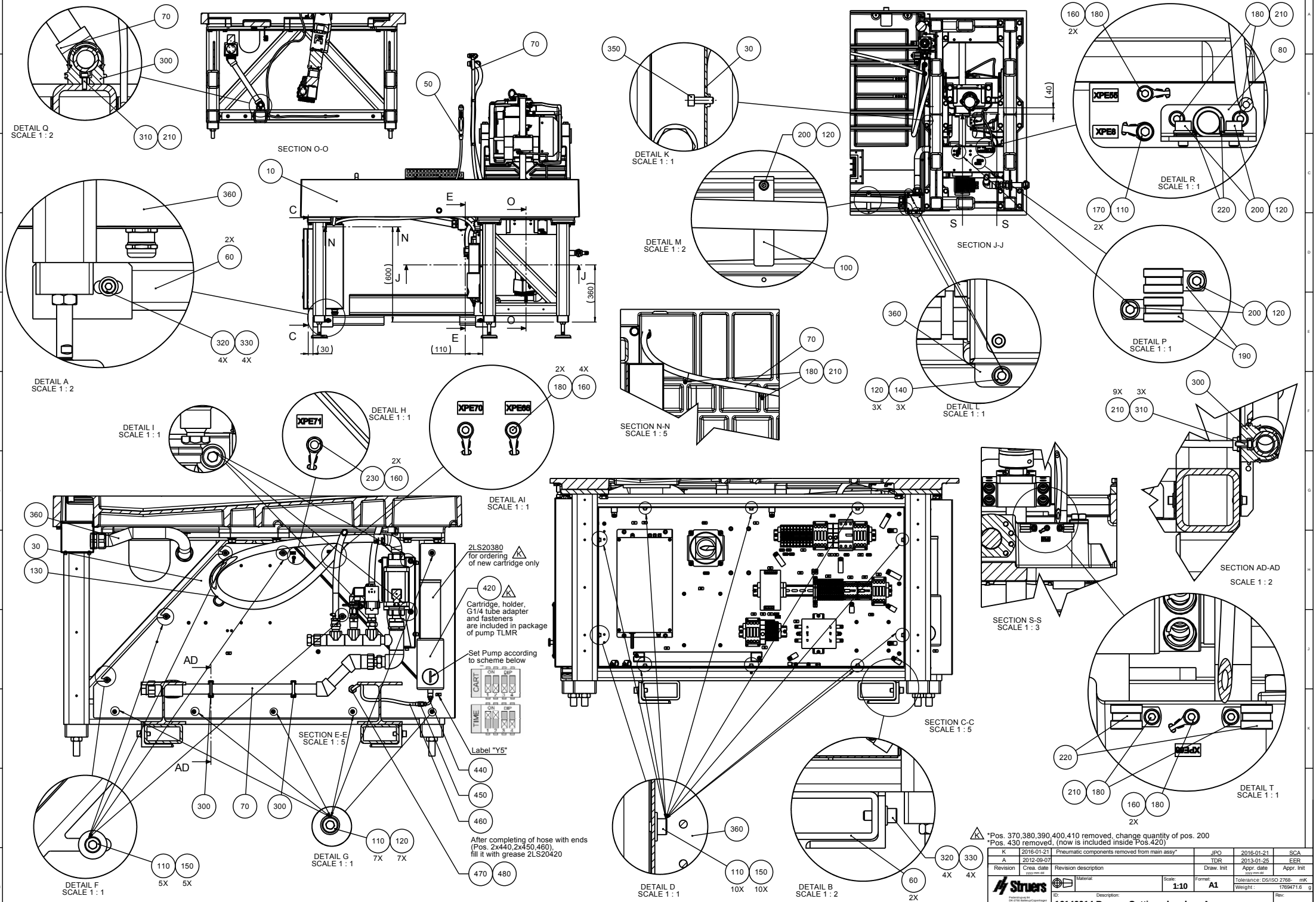
ID:

Description:

16140014 Base w.Cutting chamber, Ass.

page 1/2

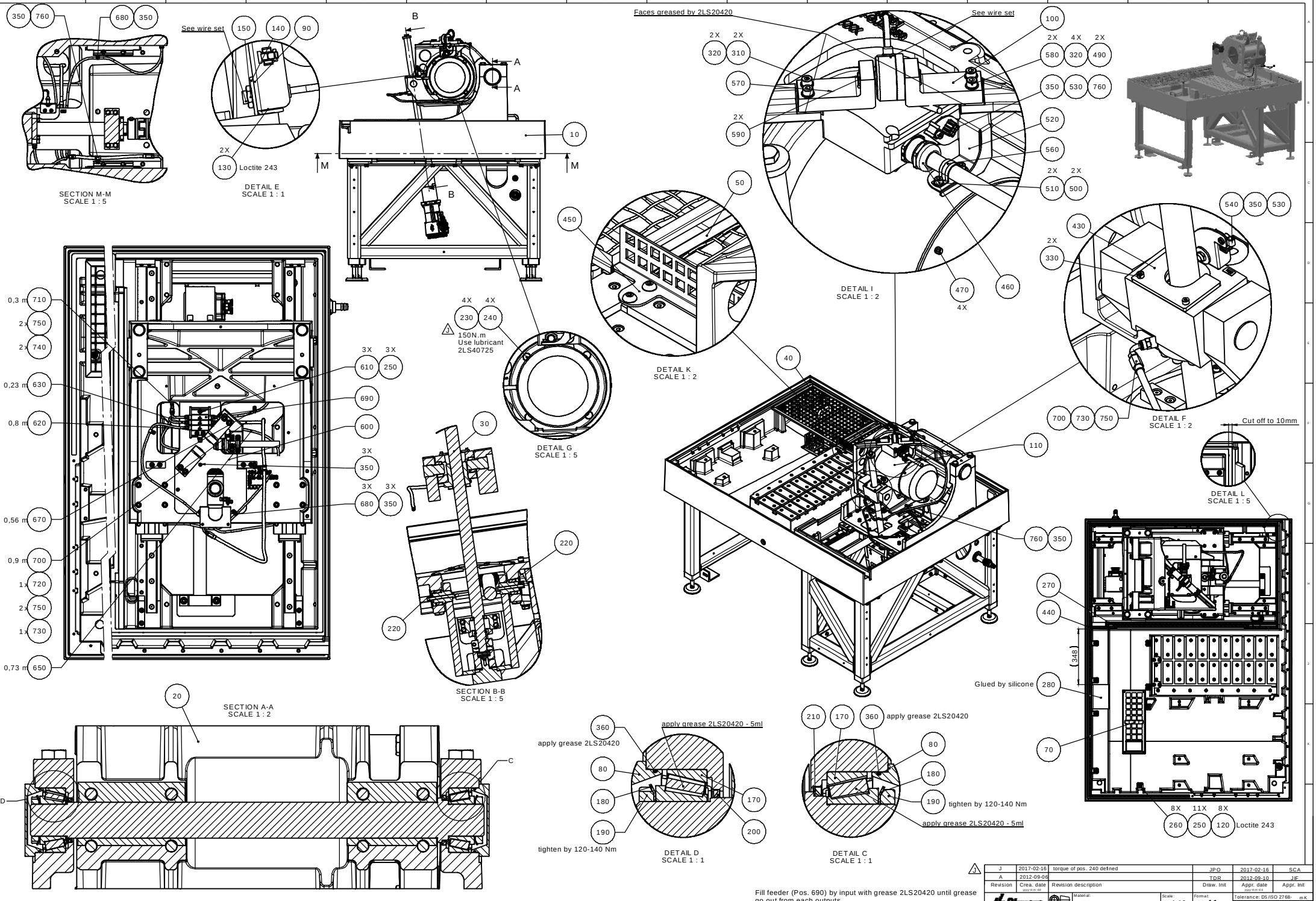
Rev: L

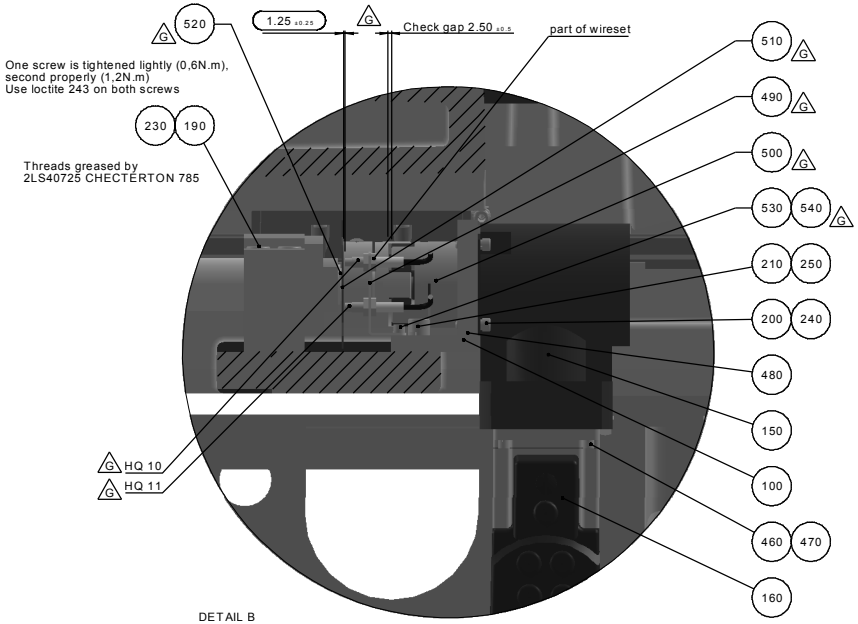


K	2016-01-21	Pneumatic components removed from main assy*		JPO	2016-01-21	SCA
A	2012-09-07			TDR	2013-01-25	EER
Revision	Crea. date yyyy-mm-dd	Revision description		Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

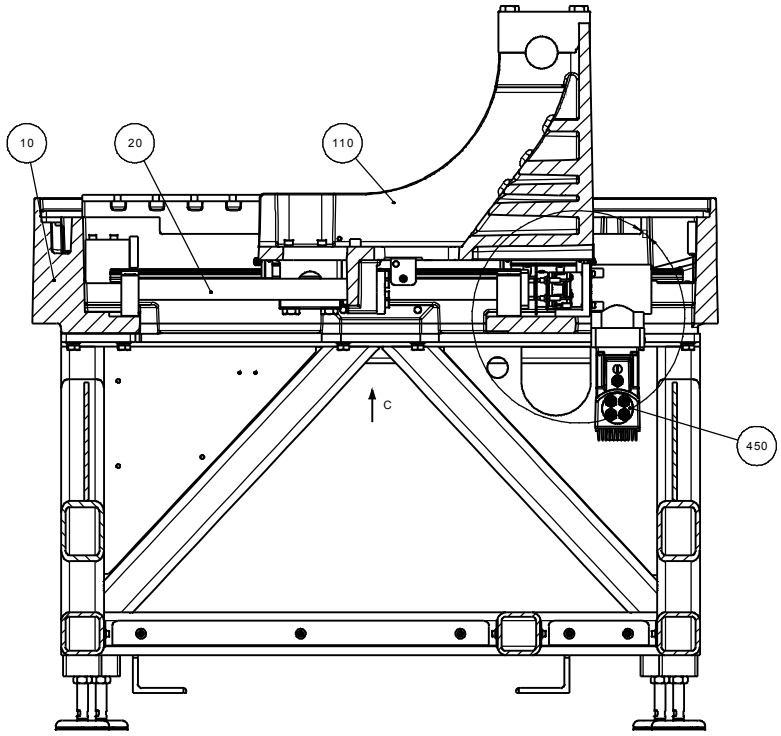
Struers — Material: — Scale: 1:10 — Format: A1 — Tolerance: DS/ISO 2768- mK — Weight: 1769471.6 g

ID: — Description: **16140014 Base w.Cutting chamber, Ass.** — page 1/2 — Rev: **K**

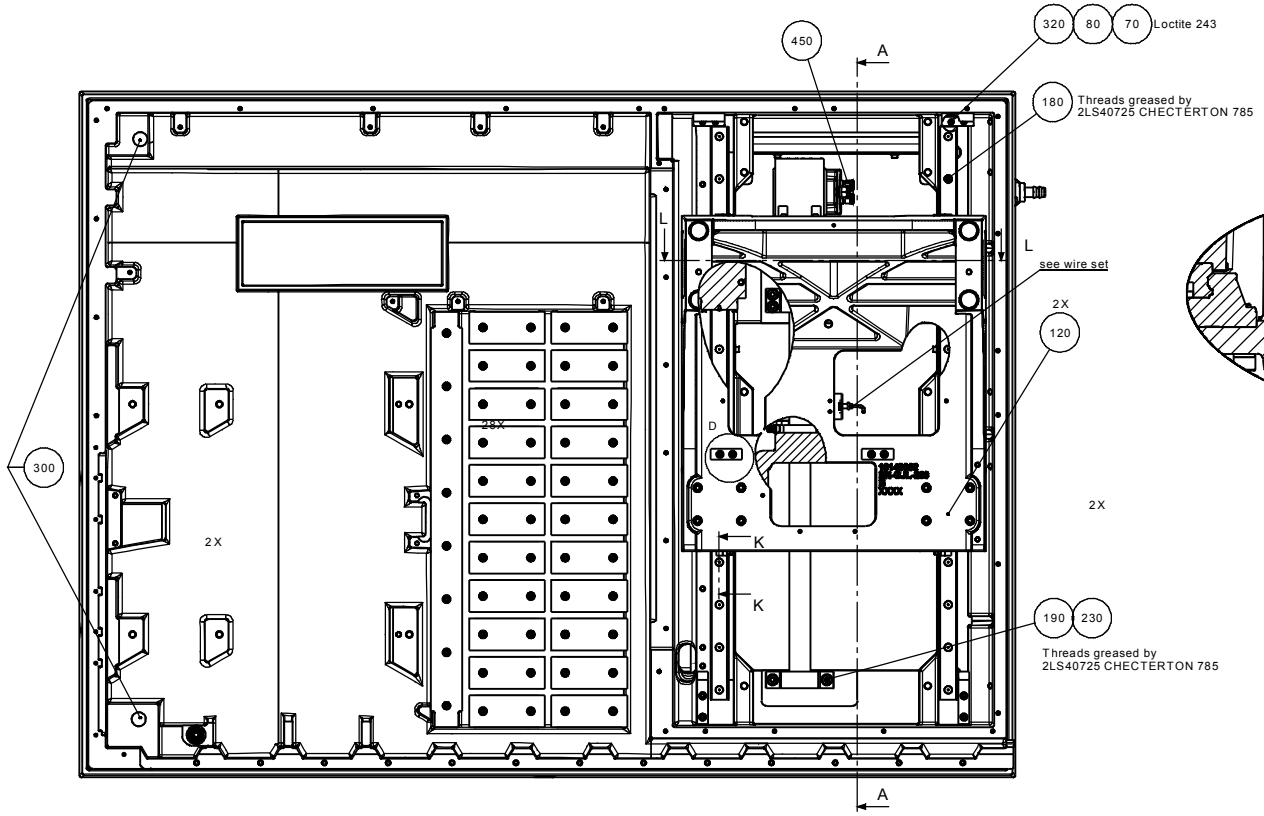

SECTION M-M
SCALE 1 : 5
DETAIL E
SCALE 1 : 1
See wire set
Loctite 243
Faces greased by 2LS20420
DETAIL I
SCALE 1 : 2
DETAIL K
SCALE 1 : 2
DETAIL F
SCALE 1 : 2
DETAIL G
SCALE 1 : 5
150N.m
Use lubricant
2LS40725
SECTION B-B
SCALE 1 : 5
DETAIL L
SCALE 1 : 5
Cut off to 10mm
SECTION A-A
SCALE 1 : 2
DETAIL D
SCALE 1 : 1
DETAIL C
SCALE 1 : 1
apply grease 2LS20420 - 5ml
apply grease 2LS20420
tighten by 120-140 Nm
Glued by silicone
Fill feeder (Pos. 690) by input with grease 2LS20420 until grease go out from each outputs.
Fill hoses (Pos. 620,630,650,670,700,710) with grease 2LS20420.
16140015 Base with both movements

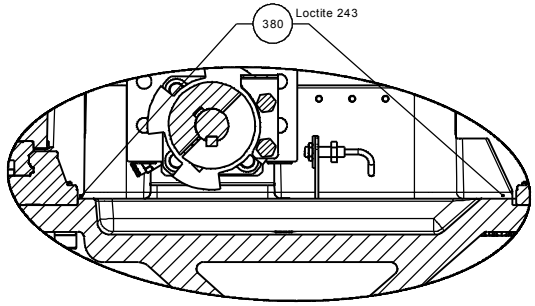


DETAIL B
SCALE 1 : 2

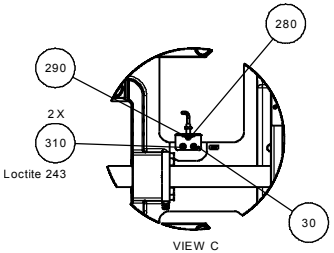


SECTION A-A

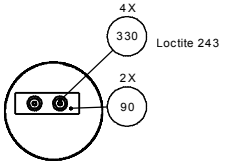




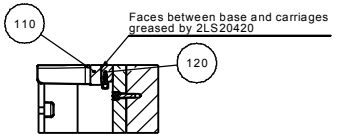
SECTION L-L
SCALE 1 : 2



VIEW C



DETAIL D
SCALE 2 : 5



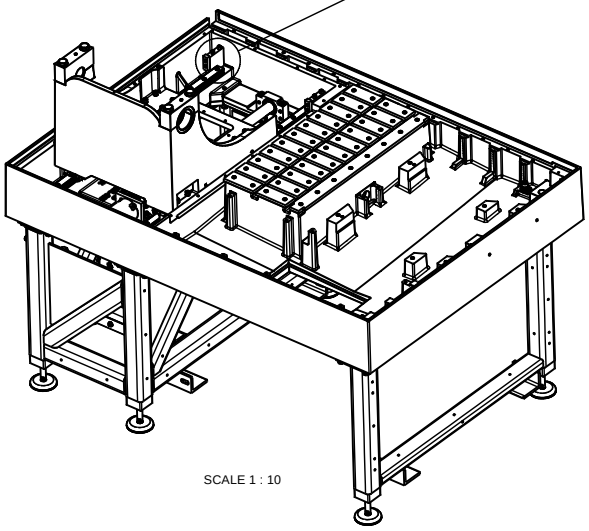
SECTION K-K

*removed Pos. 140, added Pos.490-540

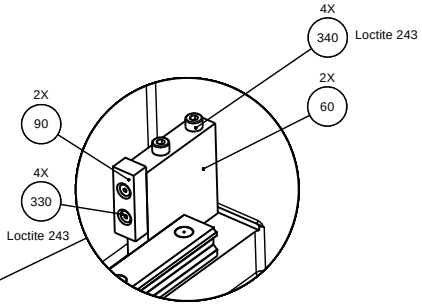
G	2017-05-22	Changes related to safety update, *	JPO	2017-05-22	SCA
A	2012-06-15		TDR	2013-03-07	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers — Material: — Scale: 1:5 — Format: A1 — Tolerance: DS/ISO 2768- mK — Weight : g

ID: 16140018 — Description: Base with Y movement — Rev: G

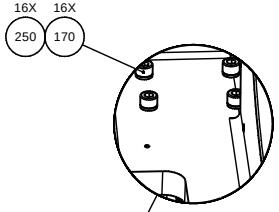


SCALE 1 : 10

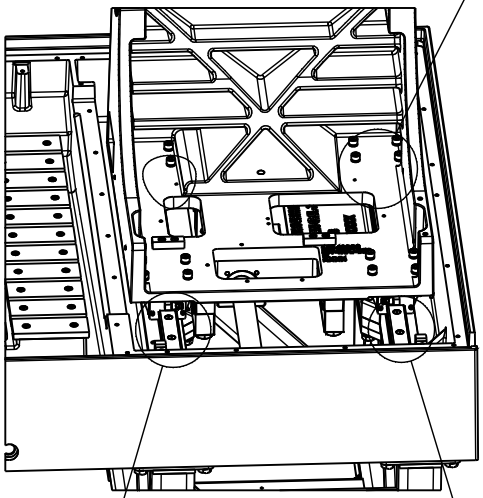


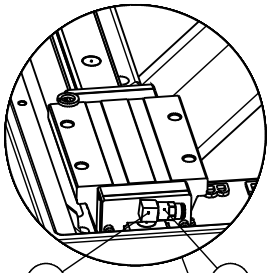
DETAIL E
SCALE 1 : 2

Threads greased by
2LS40725 CHECTERTON 785

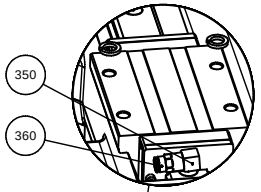


DETAIL H
SCALE 2 : 5

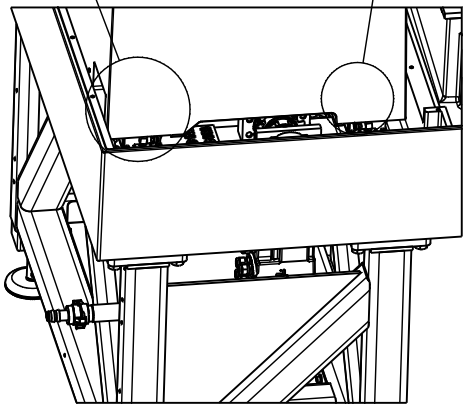


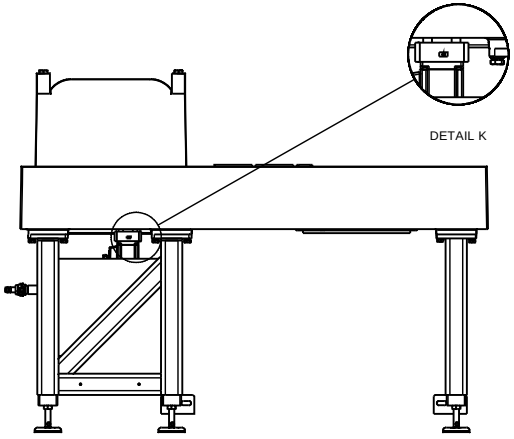


DETAIL I
SCALE 1 : 2



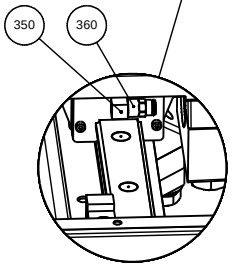
DETAIL J
SCALE 1 : 2



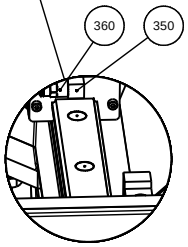


SCALE 1 : 10

DETAIL K



DETAIL F
SCALE 1 : 2



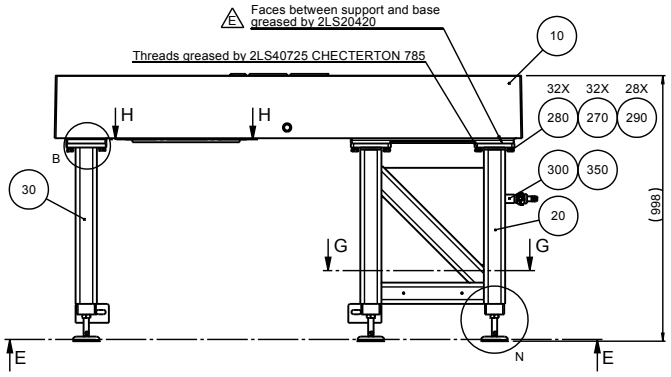
DETAIL G
SCALE 1 : 2

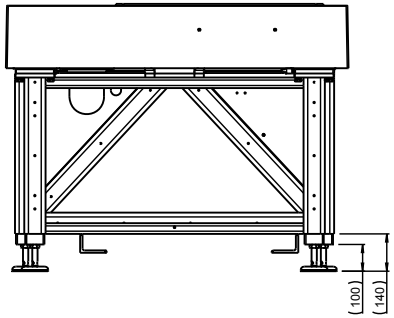
G	2017-05-22	Changes related to safety update, *	JPO	2017-05-22	SCA
A	2012-06-15		TDR	2013-03-07	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

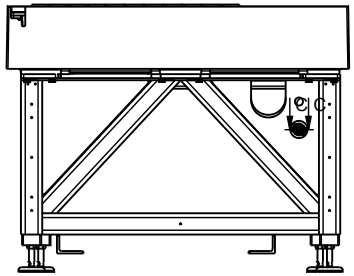
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone +45 44 600 800
Fax +45 44 600 801

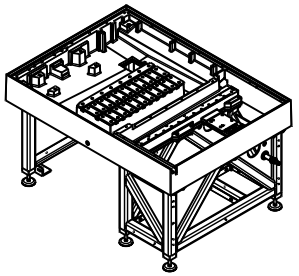
Material:	Scale: 1:5	Format: A1	Tolerance: DS/ISO 2768- mK
			Weight : g

ID:
Description: **16140018 Base with Y movement**
Rev: **G**

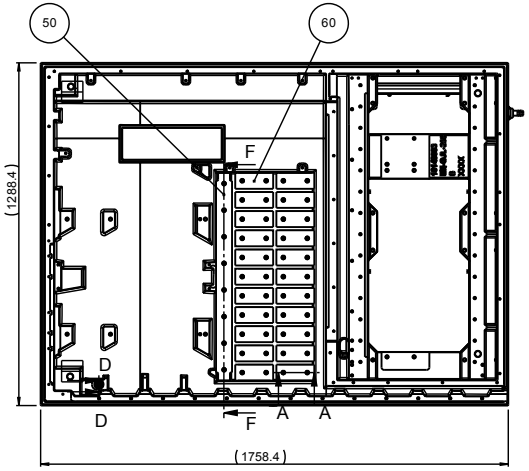


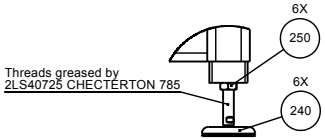




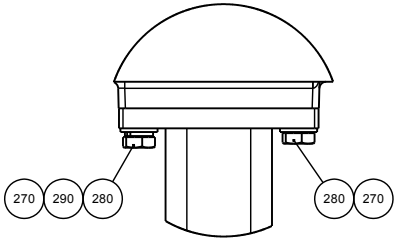


SCALE 1 : 20

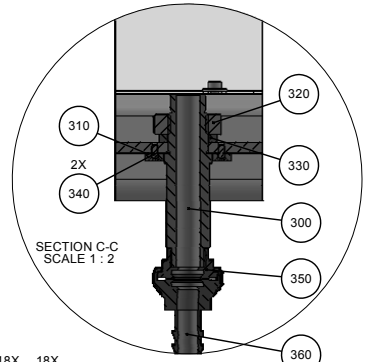




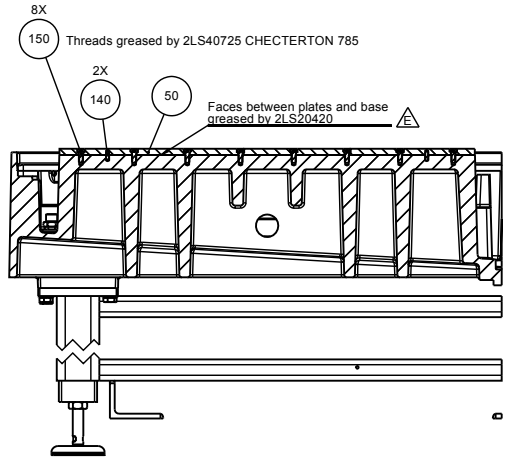
DETAIL N
SCALE 1 : 5



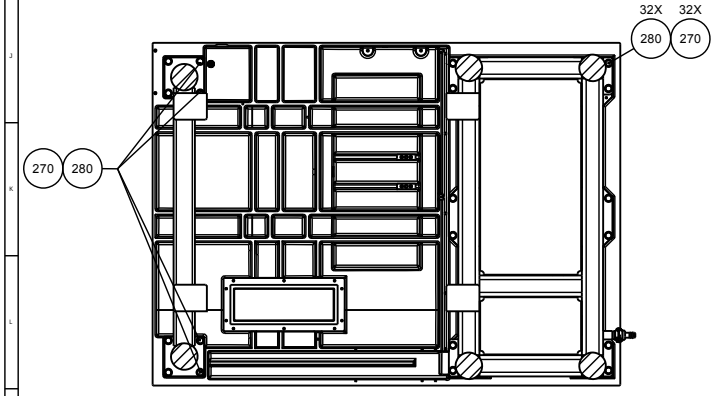
DETAIL B
SCALE 1 : 2



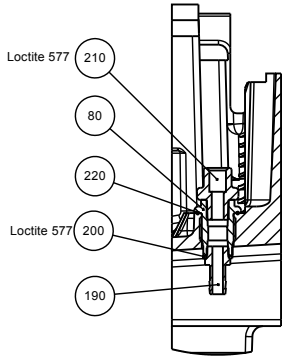
SECTION C-C
SCALE 1 : 2



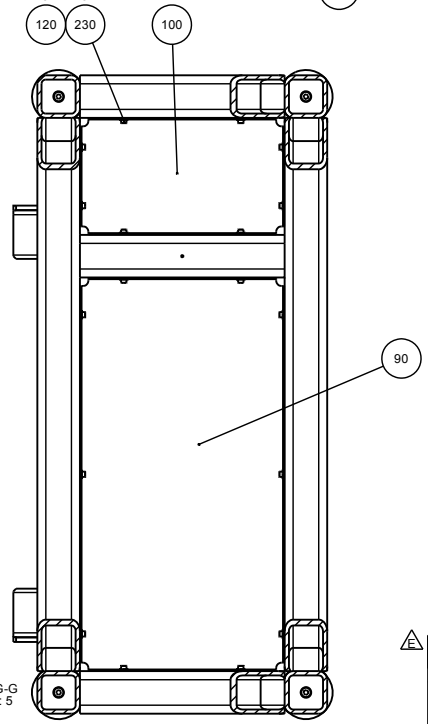
SECTION F-F
SCALE 1 : 5



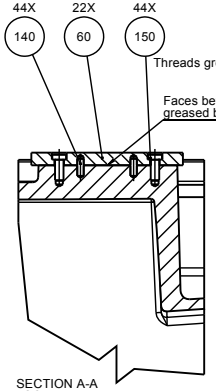
SECTION E-E



SECTION D-D
SCALE 1 : 2



SECTION G-G
SCALE 1 : 5



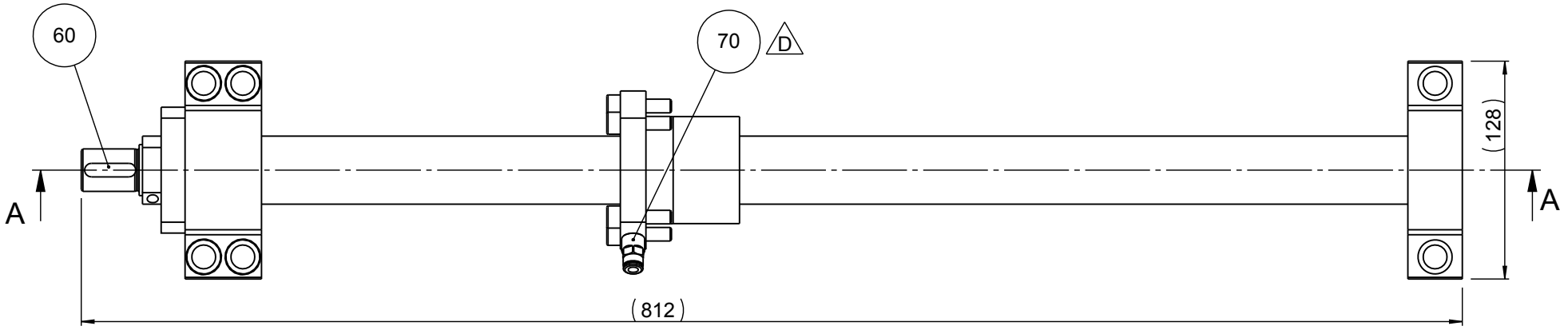
SECTION A-A
SCALE 2 : 5

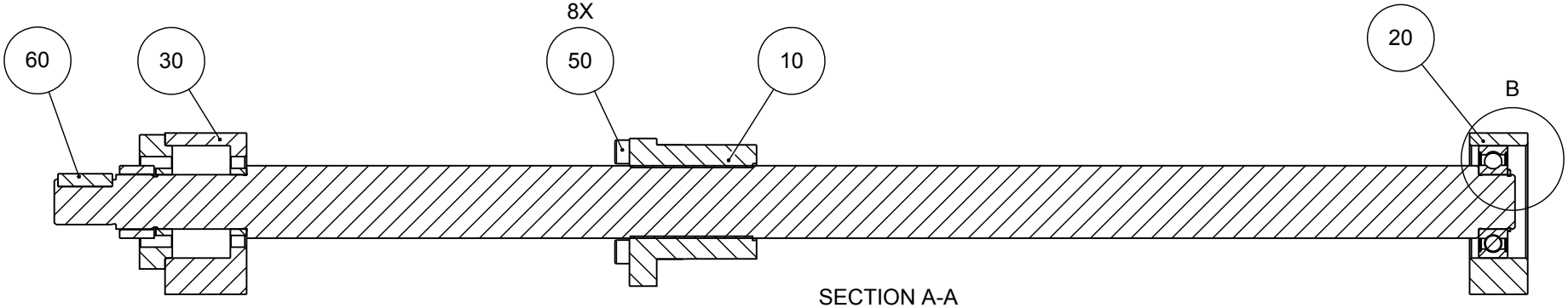
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
E	2015-09-24	Grease changed	JPO	2015-09-24	SCA
A	2012-06-14		TDR	2013-03-04	EER

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 80 0

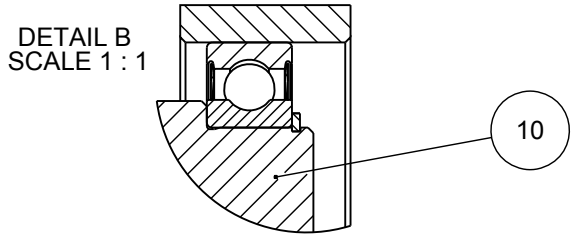
Material:	Scale: 1:10	Format: A1	Tolerance: DS/ISO 2768- mK
			Weight : 1264.58 g

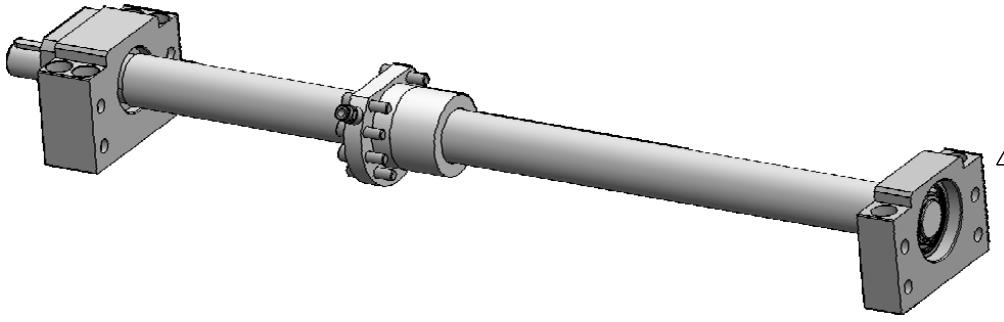
ID:
Description: **16140019 Base with legs and drain**
Rev: **E**





SECTION A-A





D	2015-09-23	Replaced Pos. 70	JPO	2015-09-23	SCA
A	2012-05-01		TDR	2013-02-26	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

Material:

Scale: **2:5**

Format: **A3**

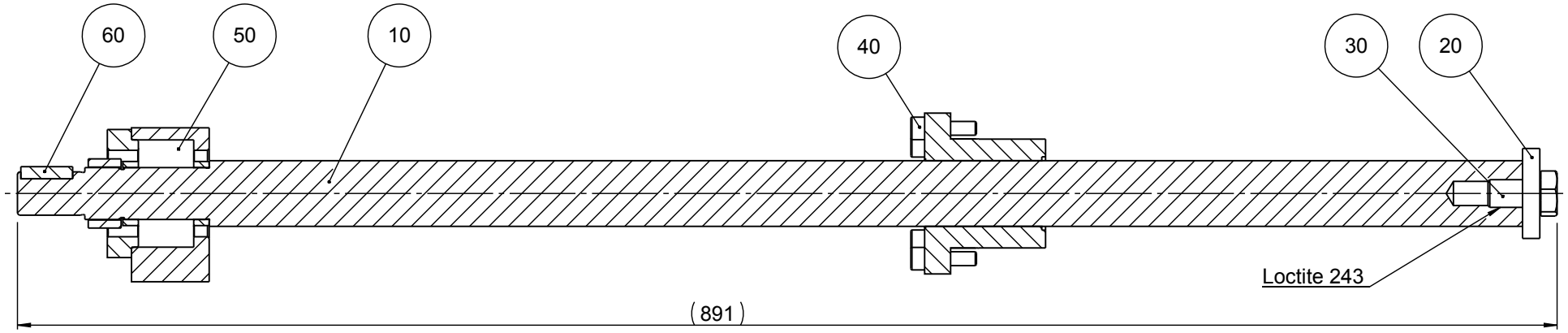
Tolerance: DS/ISO 2768- mK

Weight : 8131.0 g

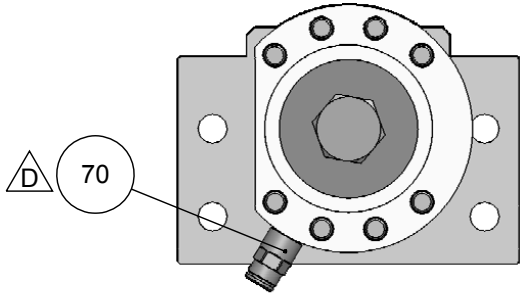
ID: Description:

16140020 Ball Screw Complete, Y-movement

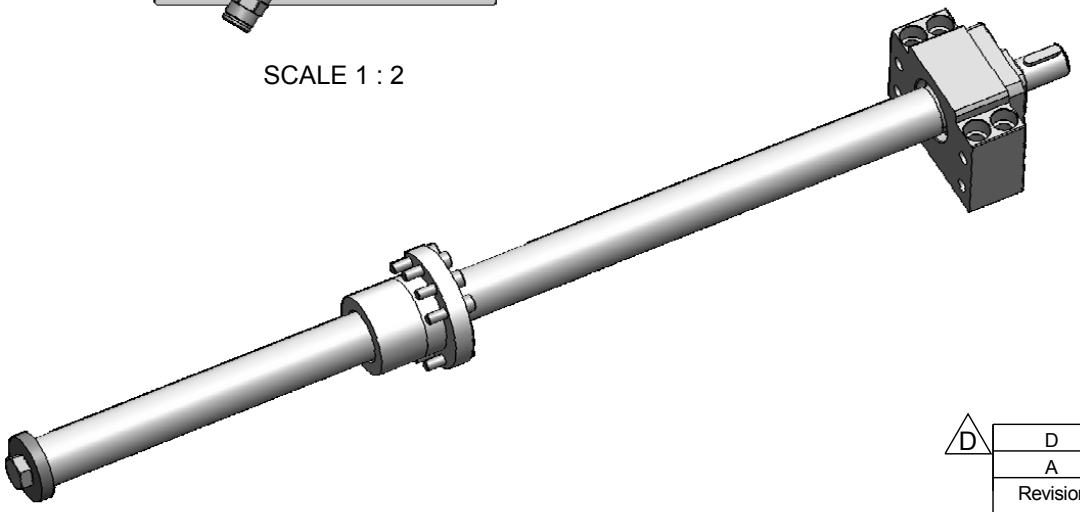
Rev: **D**

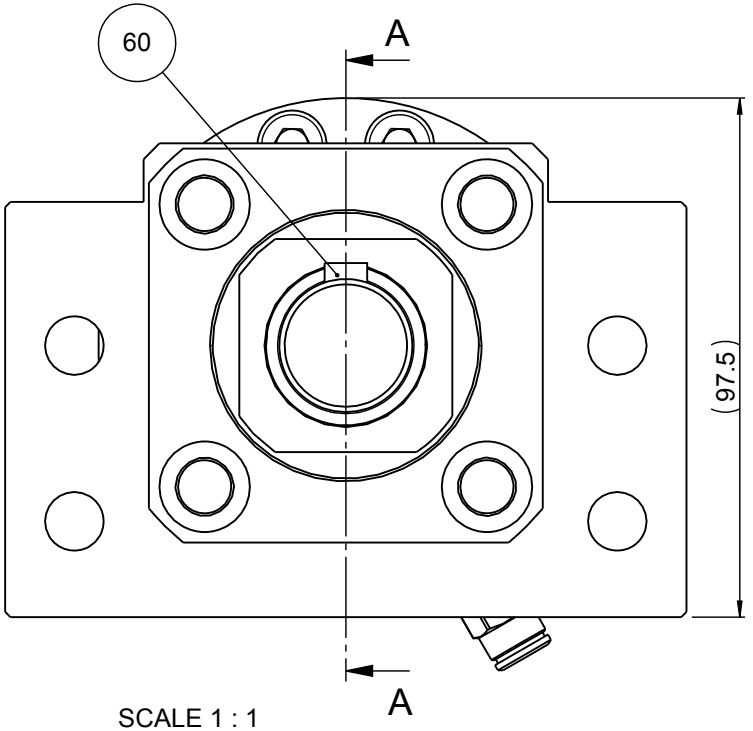


SECTION A-A



SCALE 1 : 2





SCALE 1 : 1

D	2015-09-23	Replaced Pos.70	JPO	2015-09-23	SCA
A	2012-06-07		TDR	2013-01-15	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

Material:

Scale: 2:5

Format: A3

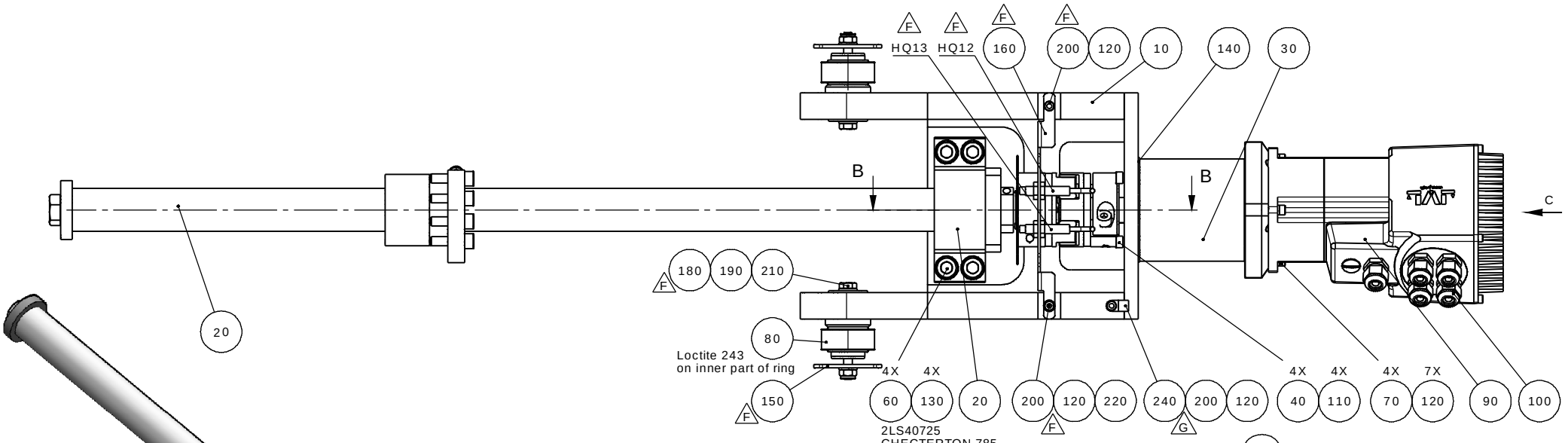
Tolerance: DS/ISO 2768- mK

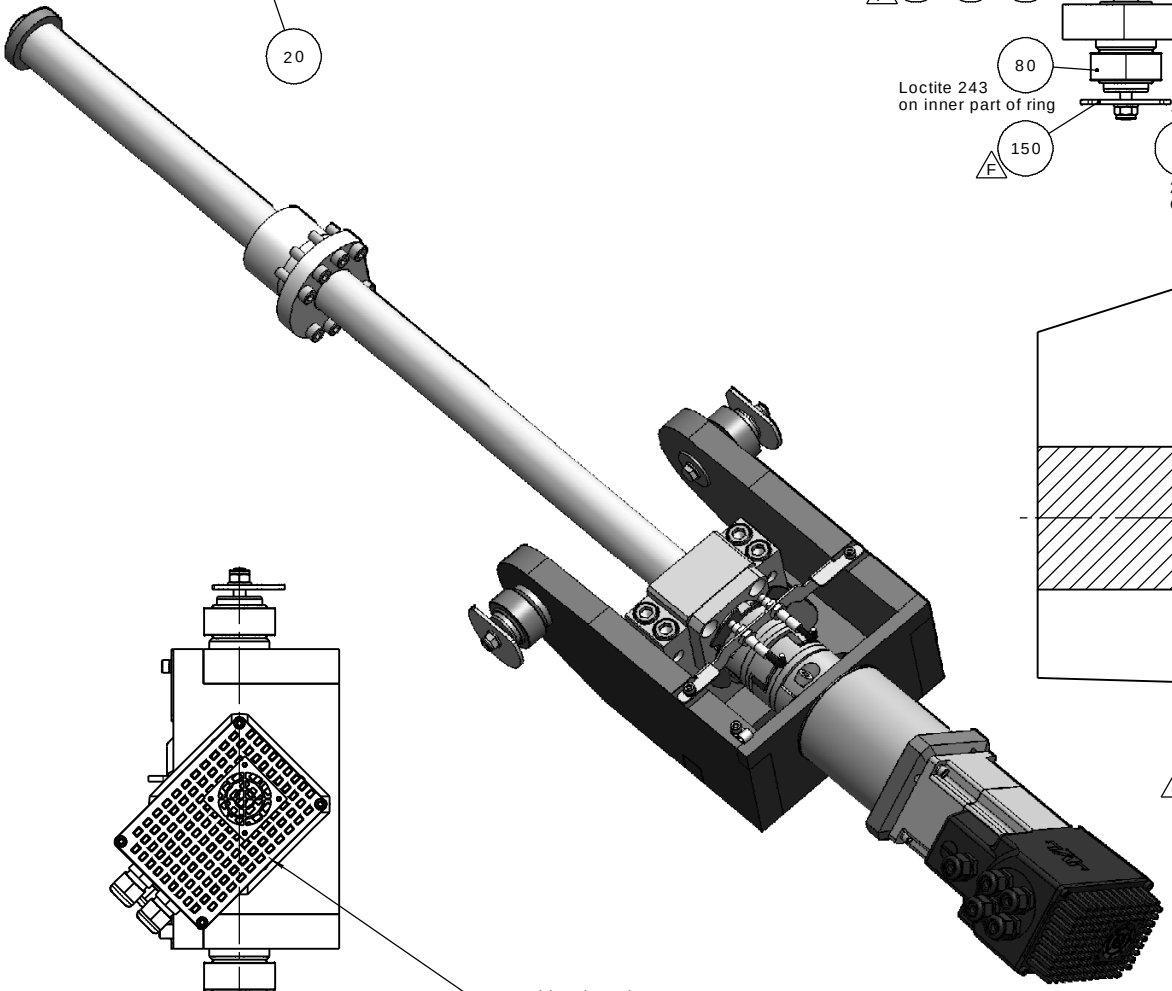
Weight : 7980.3 g

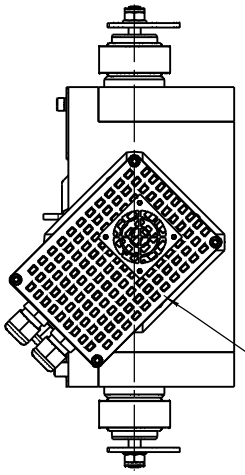
ID: Description:

16140021 Ball Screw Complete, Z-movement

Rev: D

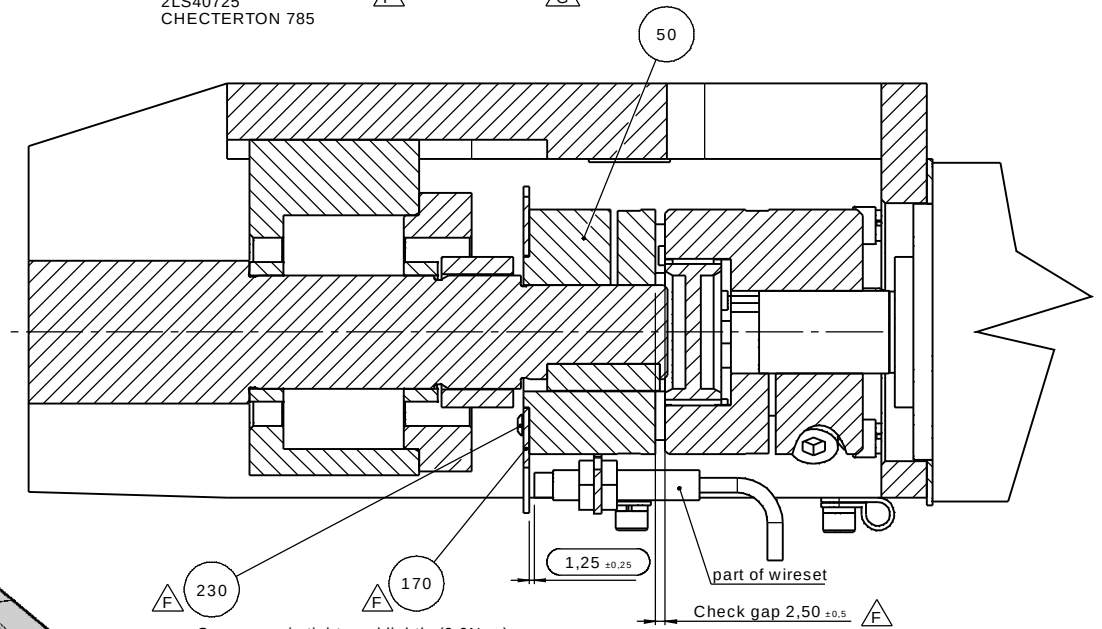






motor this orientation

VIEW C



One screw is tightened lightly (0,6N.m),
second properly (1,2N.m)
Use loctite 243 on both screws

SECTION B-B
SCALE 1 : 1

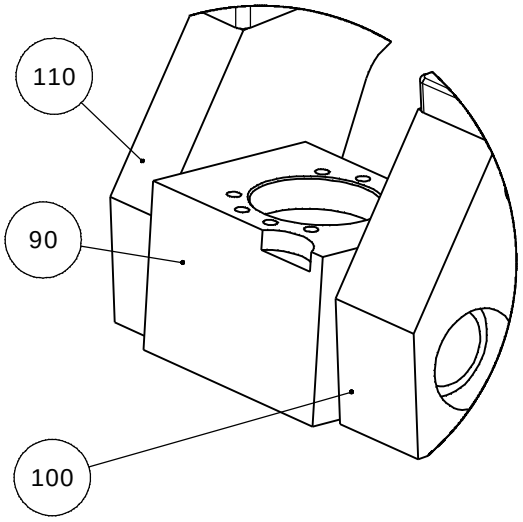
G F * easier adjusting changes pos. 50 replaced, added pos. 150-240

G	2017-06-07	For Rev. E. and Rev. G: Safety update changes*	JPO	2017-06-07	SCA
A	2012-06-07		TDR	2013-01-15	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

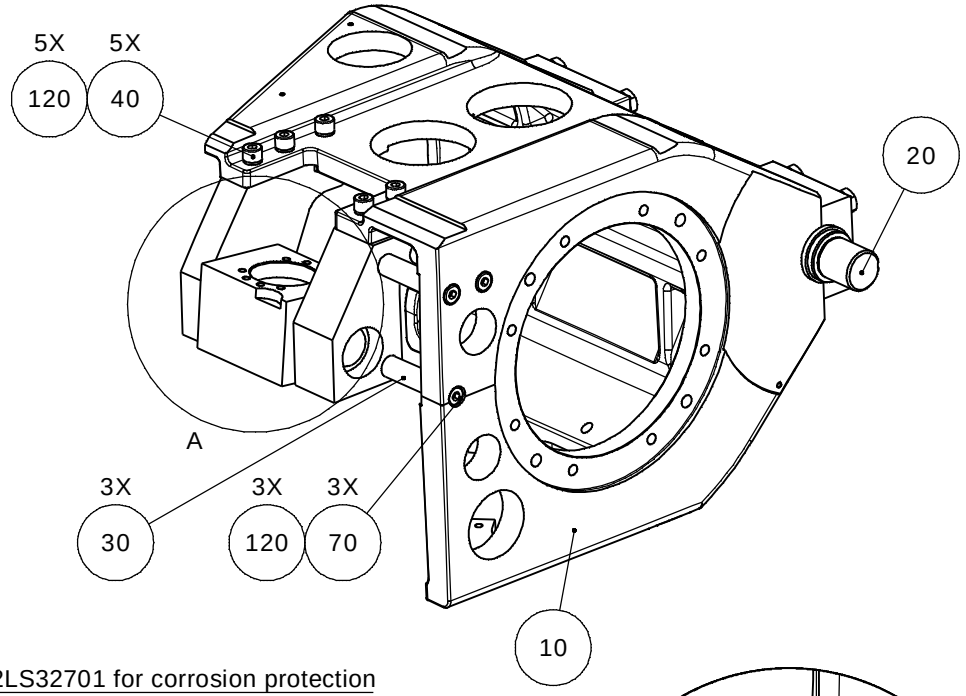
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 801

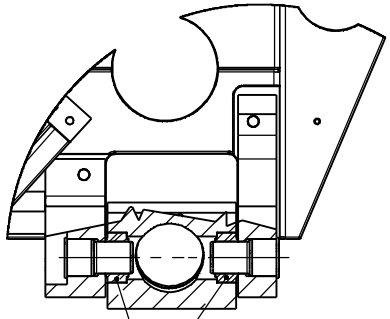
Material:
Scale: 2:5
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 26247.2 g

ID:
Description: 16140022 Servomotor Base Z-movement, Assembled
Rev: G

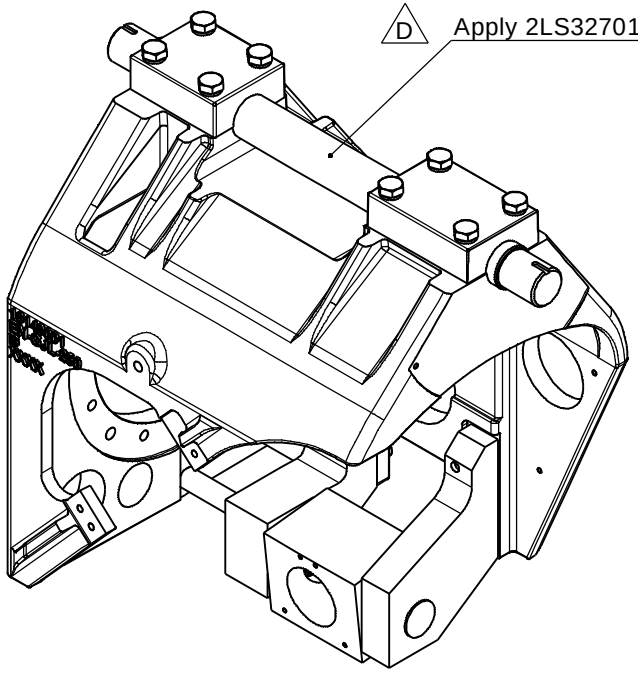


DETAIL A
SCALE 2 : 5

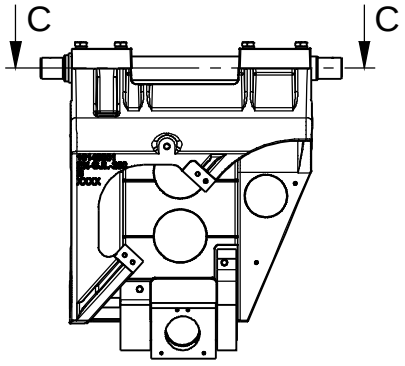




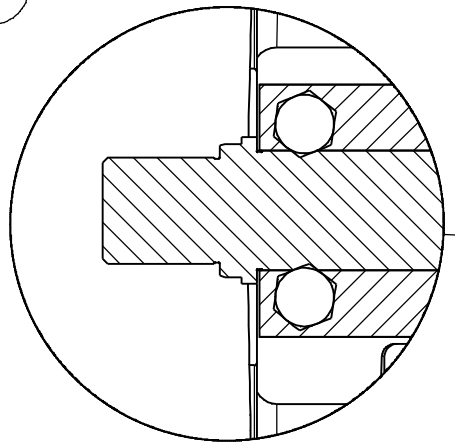
install bearings first to hole



D Apply 2LS32701 for corrosion protection

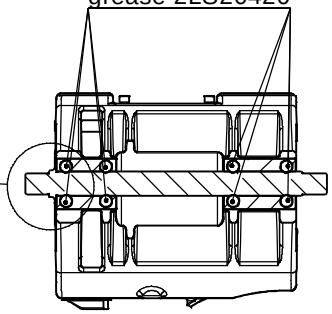


SCALE 1 : 10



DETAIL D
SCALE 1 : 2

grease 2LS20420



SECTION C-C
SCALE 1 : 10

D	2017-10-10	Corrosion protection added	GVA	2017-10-10	SCA
A	2012-12-04		TDR	2013-03-08	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

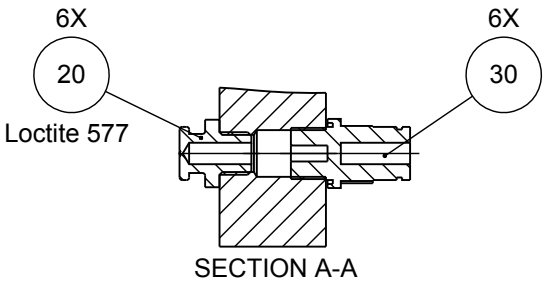
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

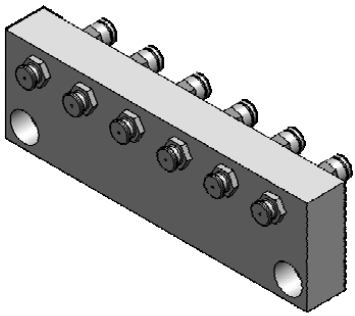
Material: ERROR!:sMaterial	Scale: 1:5	Format: A3	Tolerance: DS/ISO 2768- mK
			Weight : 102220.5 g

ID: Description:

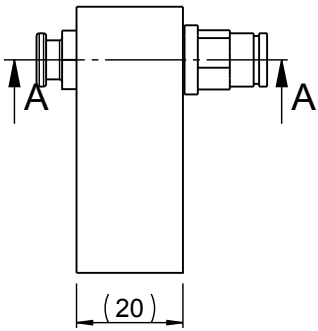
16140023 Motor Base, assembled

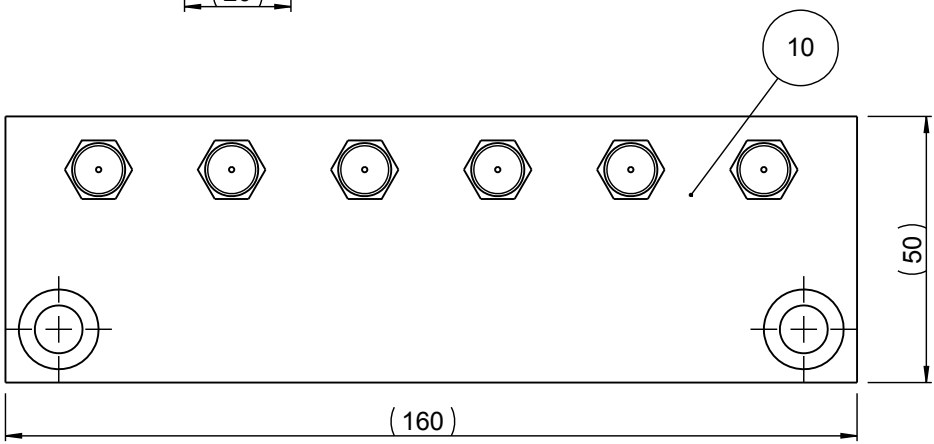
Rev: **D**





SCALE 1 : 2





Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
C	2014-02-06	changed parts pos.30	LDU	2014-02-06	ABG
A	2013-01-23		ABG	2013-01-25	ABG

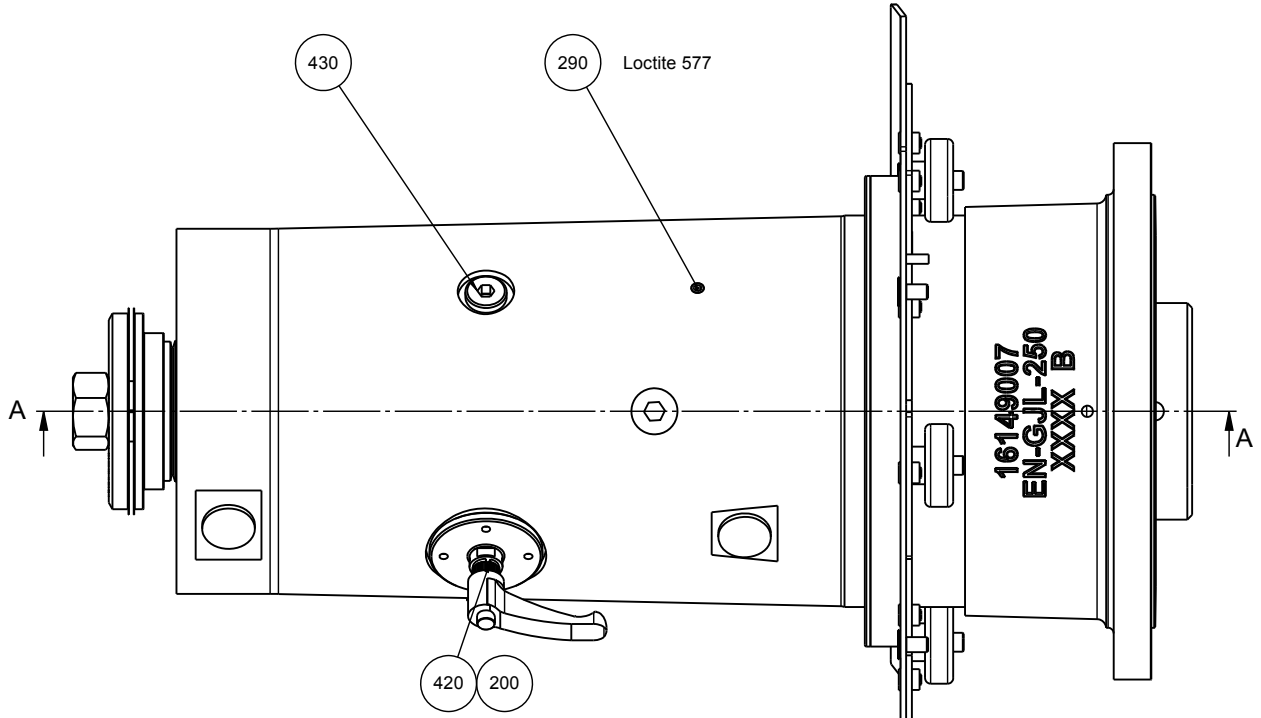
Struers
Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

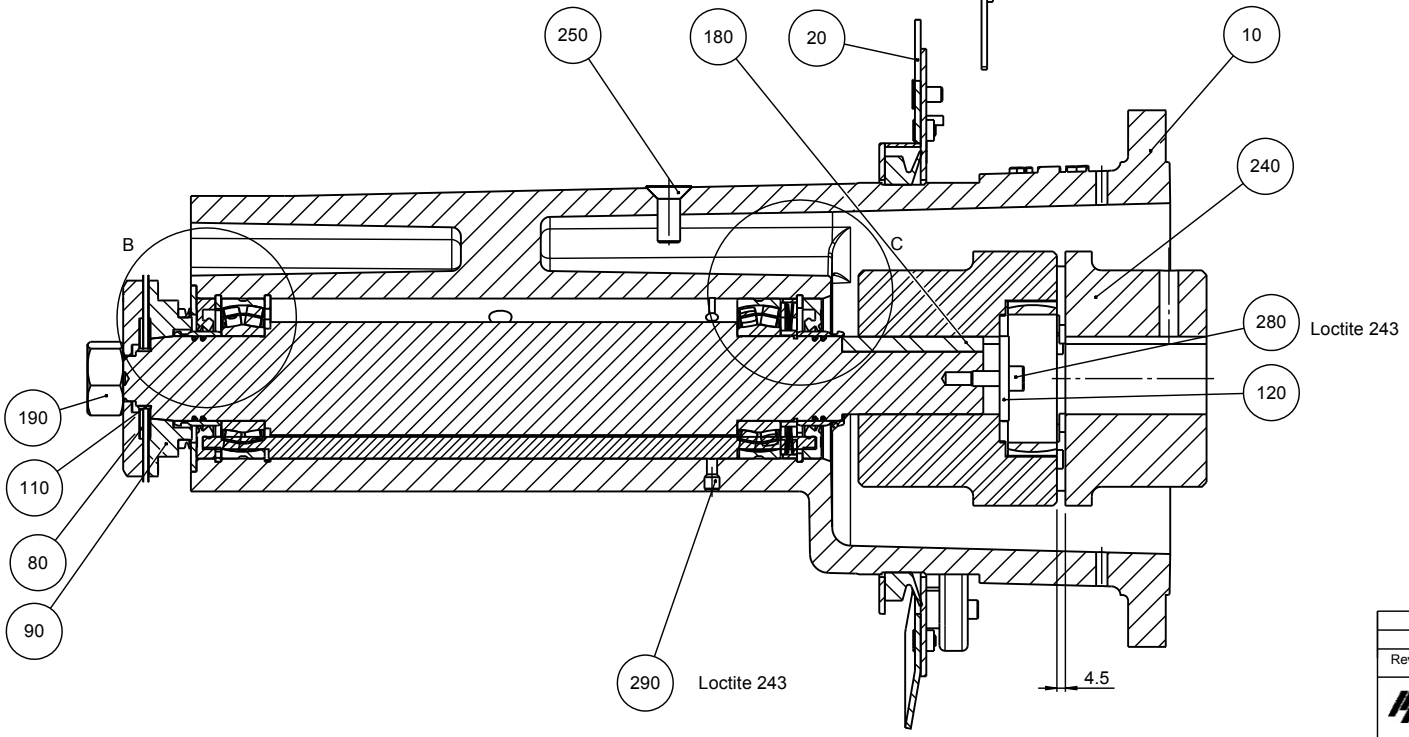
Material:	Scale:	Format:	Tolerance: DS/ISO 2768 - mK
	1:1	A4	Weight : 522.5 g

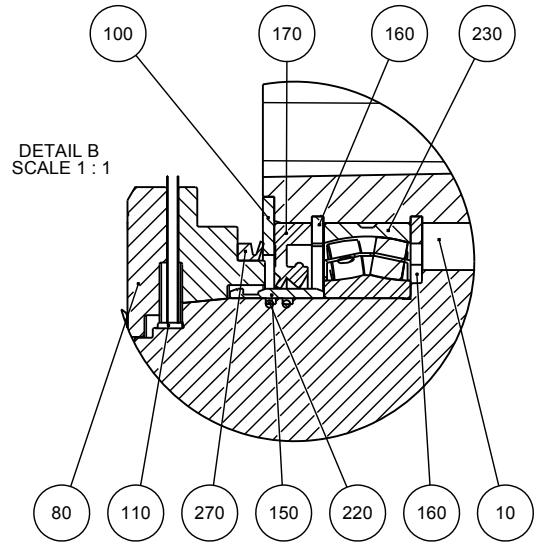
ID: Description:

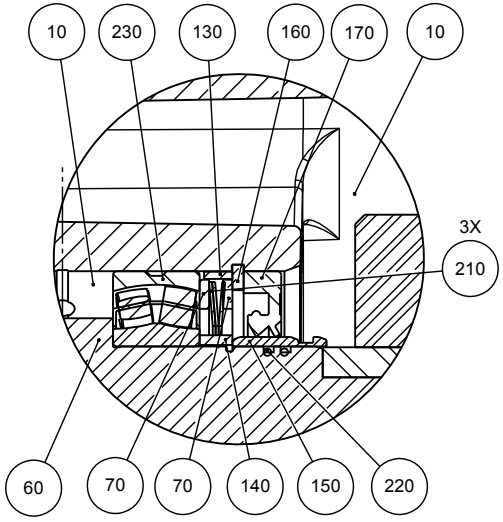
16140024 Lubrication Manifold, assembled

Rev: **C**









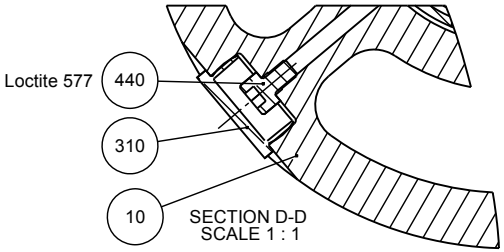
DETAIL C
SCALE 1 : 1

K	2015-07-08	changed oil	ABG	2015-07-08	SCA
A	2012-05-01		TDR	2013-03-04	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

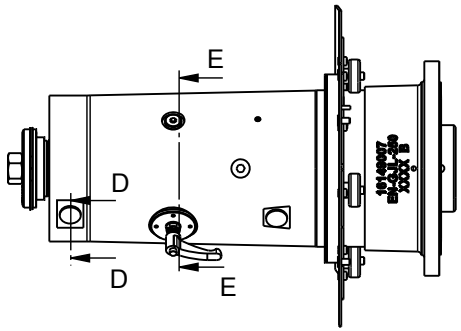
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

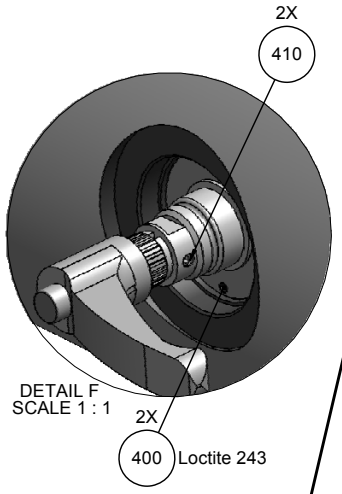
Material:
Scale: 1:2
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 67248.2 g

ID:
Description: **16140030 Spindle, Assembled**
Page 1/2
Rev: **K**

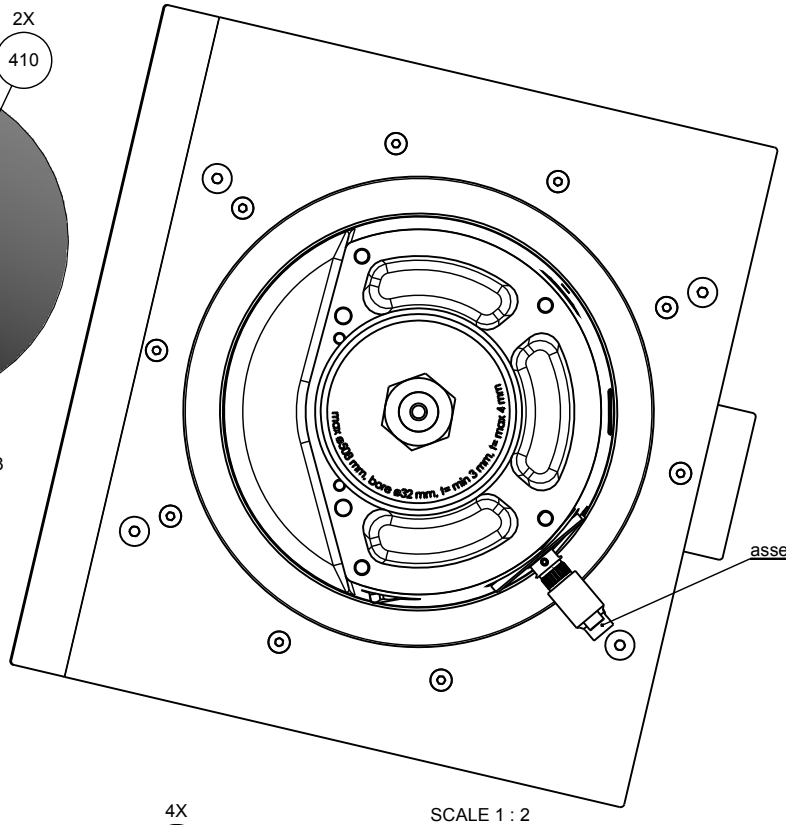


SECTION D-D
SCALE 1 : 1



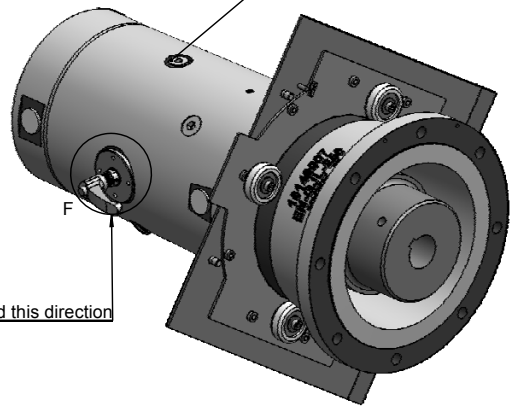


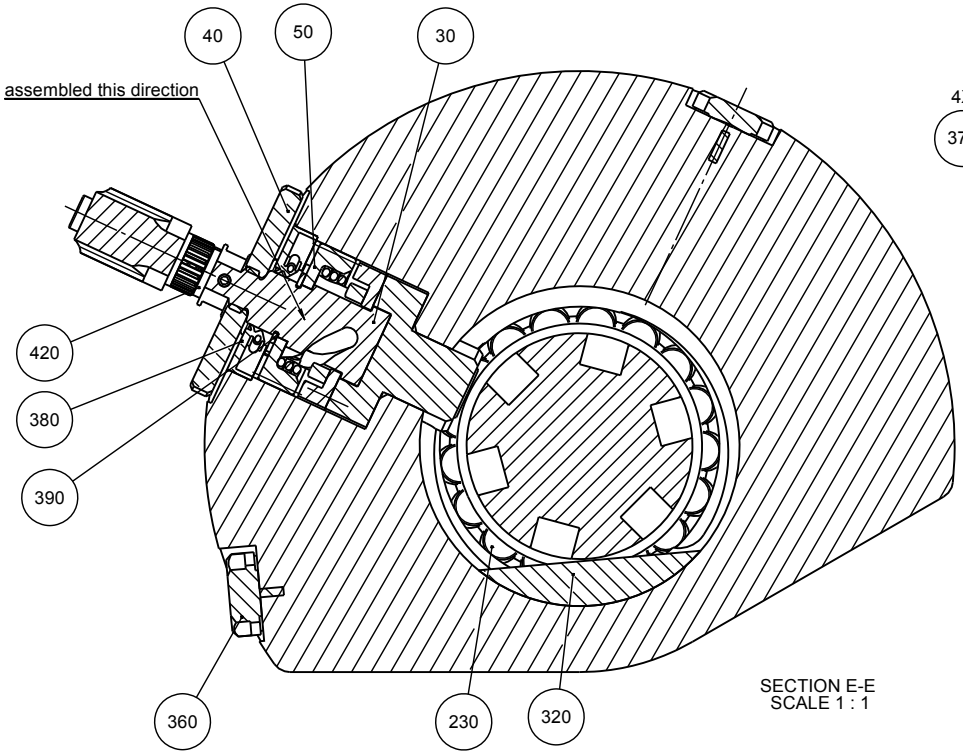
DETAIL F
SCALE 1 : 1



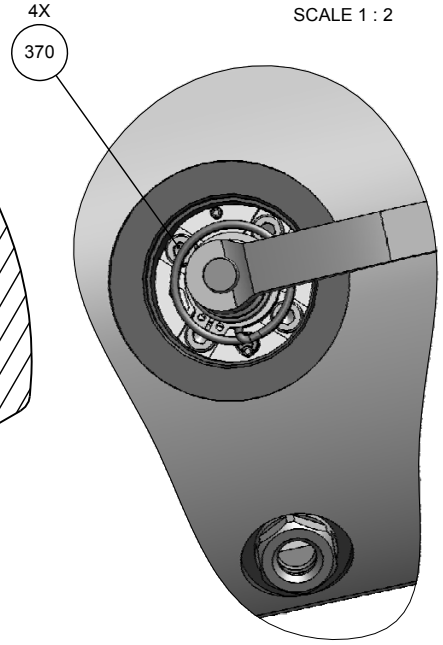
SCALE 1 : 2

Fill up with
2LS00034 Bearing Oil Paramo Ol-J32,140ml
when assembled

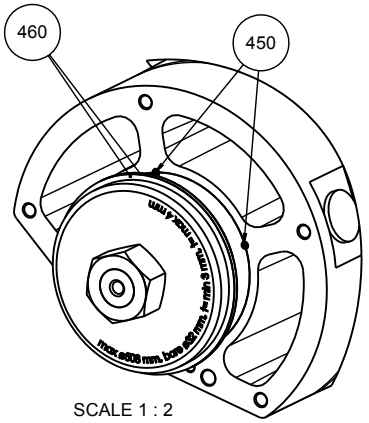




SECTION E-E
SCALE 1 : 1



SCALE 1 : 1



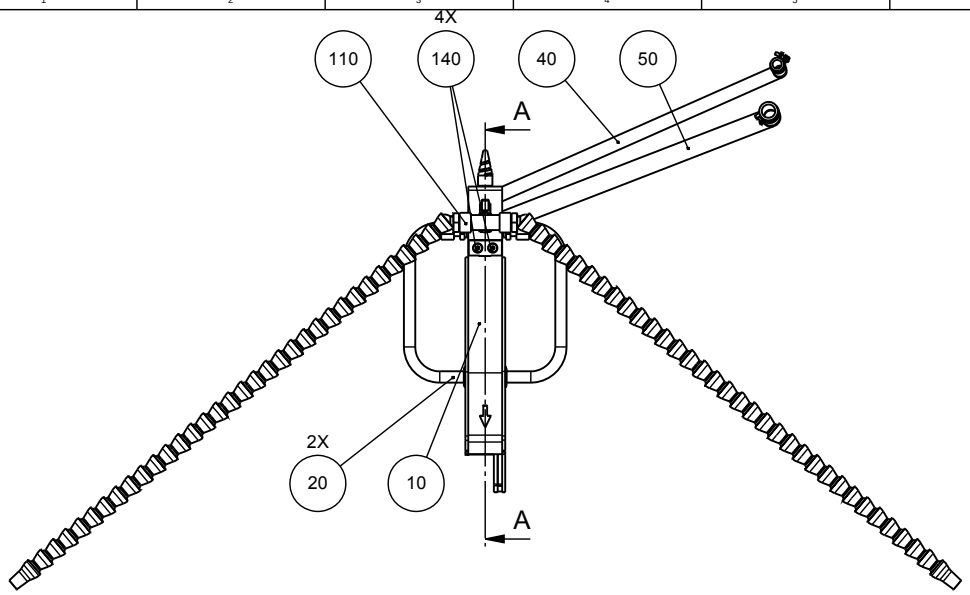
SCALE 1 : 2

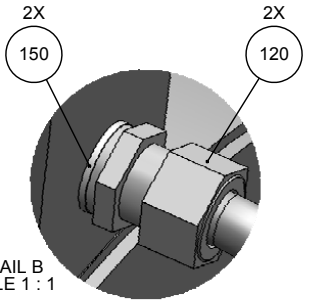
K	2015-07-08	changed oil	ABG	2015-07-08	SCA
A	2012-05-01		TDR	2013-03-04	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

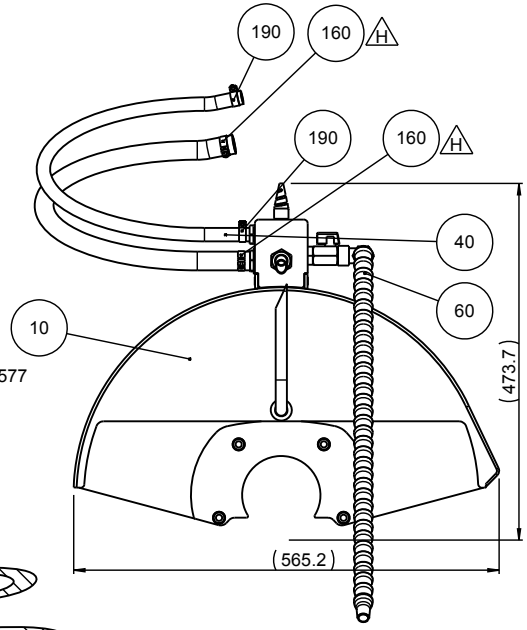
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

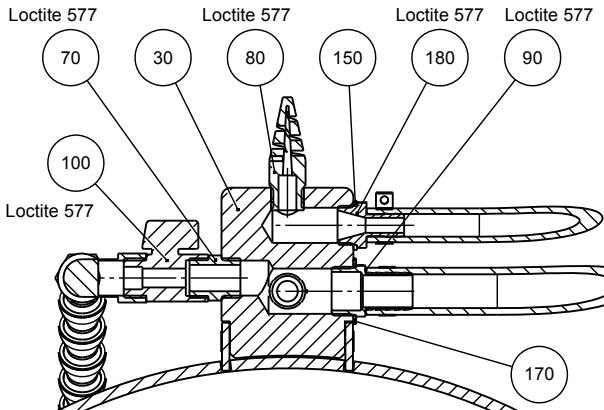
Material:
Scale: 1:5
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 67248.2 g

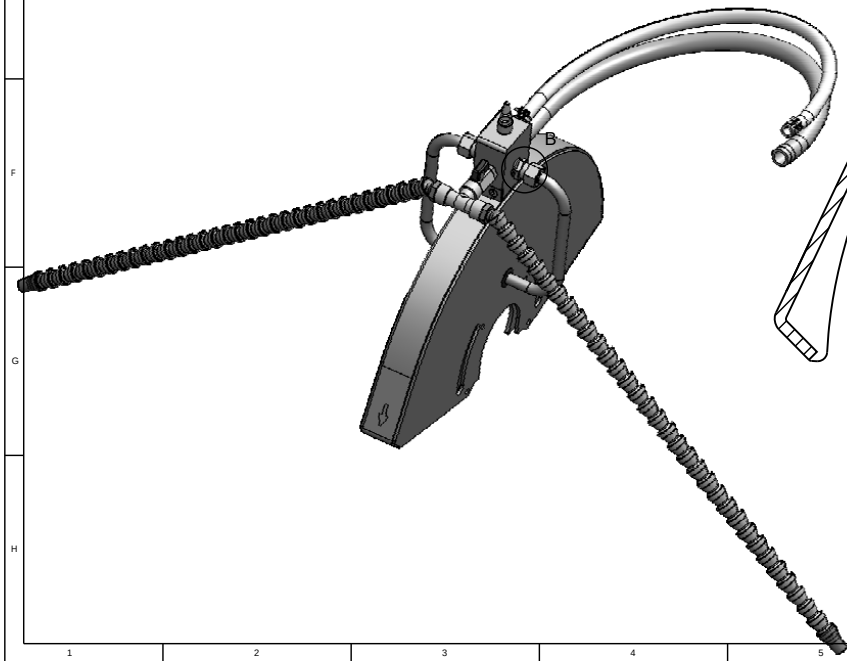
ID:
Description: **16140030 Spindle, Assembled**
Page 2/2
Rev: **K**

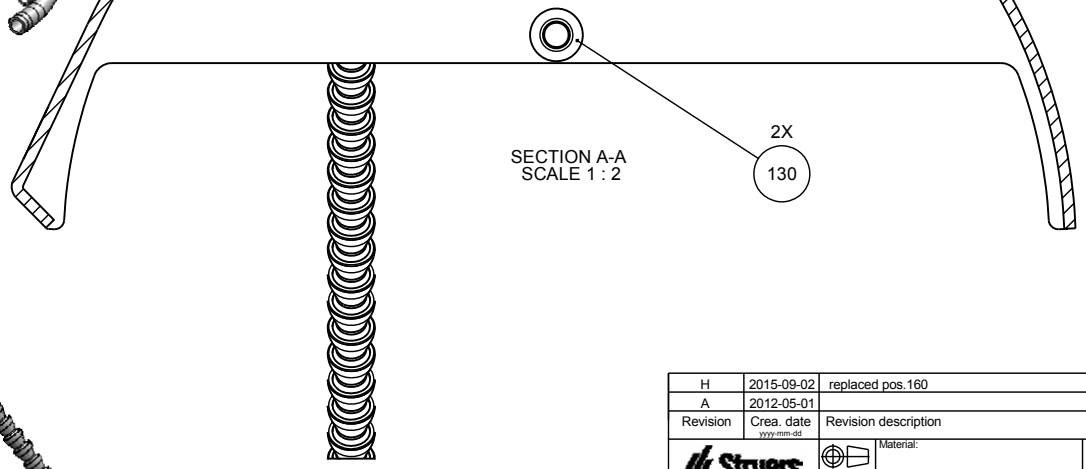












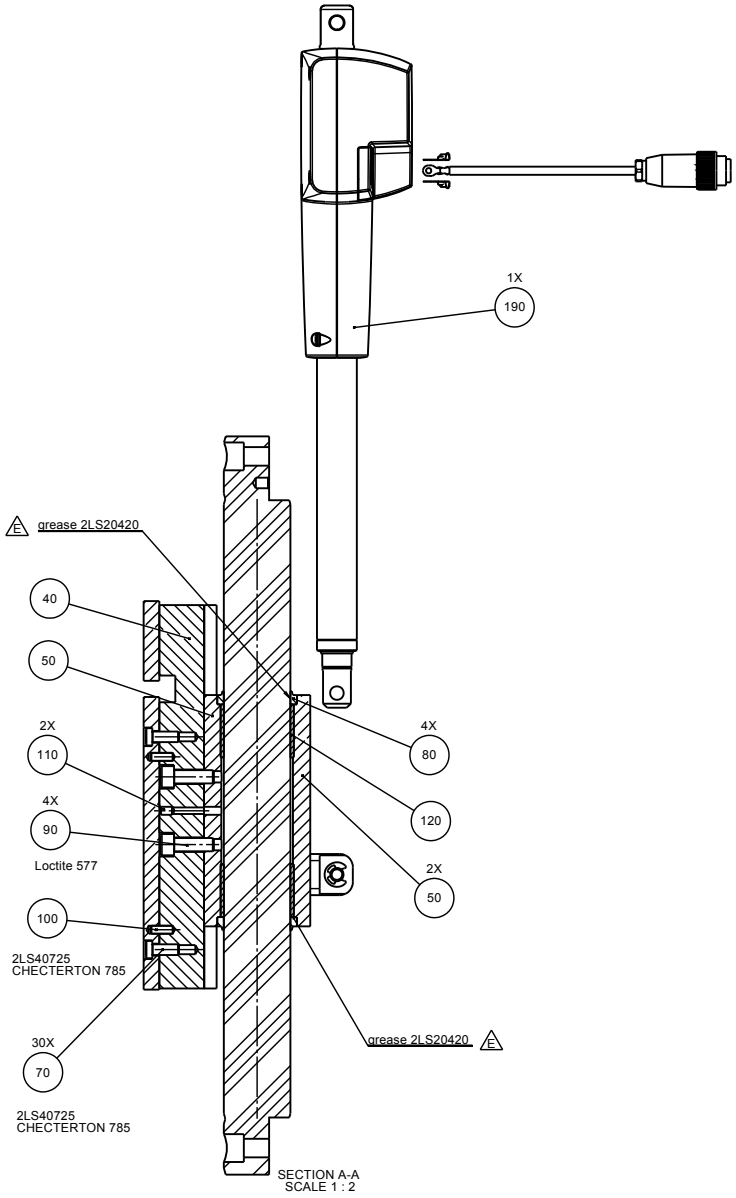
SECTION A-A
SCALE 1 : 2

H	2015-09-02	replaced pos.160	JPO	2015-09-02	SCA
A	2012-05-01		TDR	2013-03-06	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

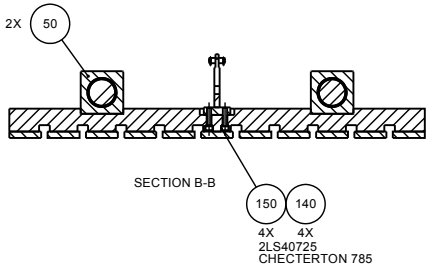
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

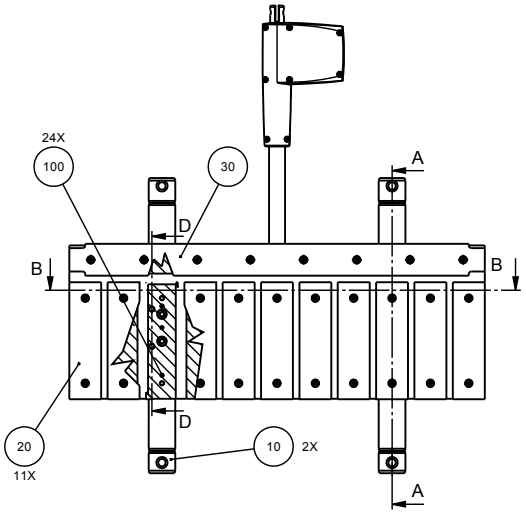
Material:
Scale: 1:5
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 12893.7 g

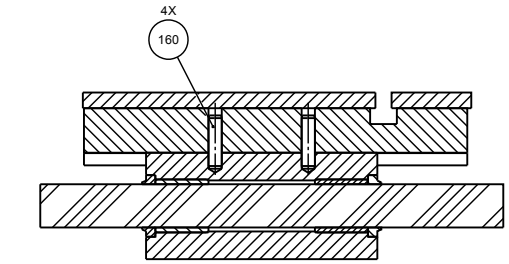
ID:
Description: **16140031 Wheel Guard, Assembled**
Rev: **H**



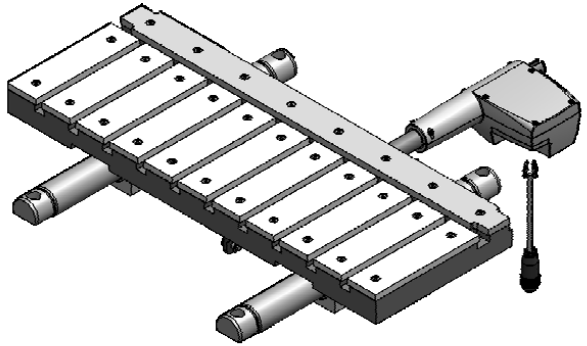
SECTION A-A
SCALE 1 : 2

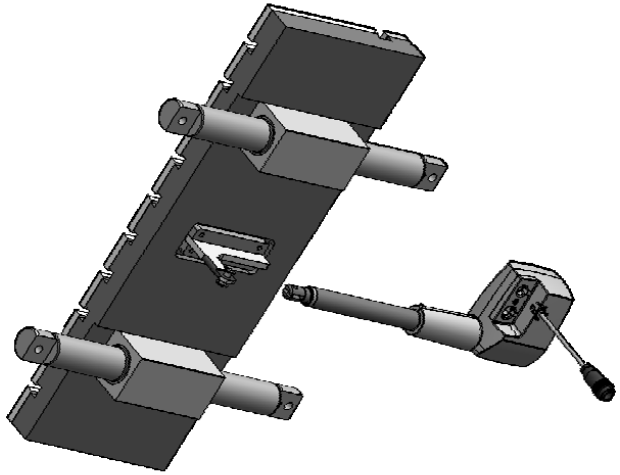






SECTION D-D
SCALE 1 : 2



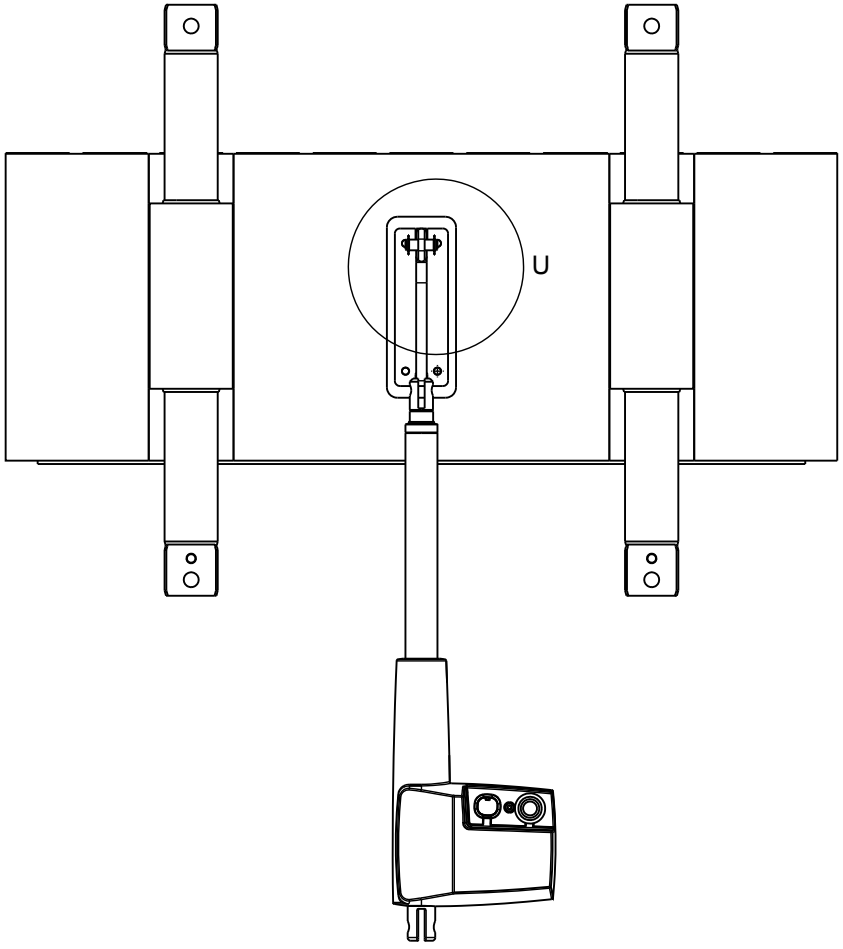


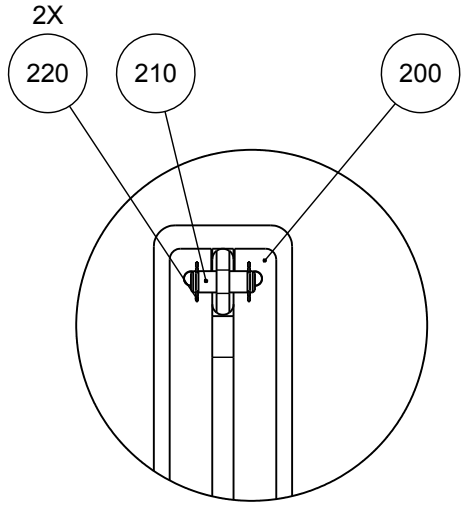
E	2015-09-24	Grease changed	JPO	2015-09-24	SCA
A	2012-08-28		TDR	2013-02-25	JIF
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 80 0

Material:
Scale: 1:5
Format: A1
Tolerance: DS/ISO 2768- mK
Weight : 48896.1 g
ID:
Description:
16140036 Cutting Table for X-table, assembled

Rev: E





DETAIL U
SCALE 2 : 5

E	2015-09-24	Grease changed	JPO	2015-09-24	SCA
A	2012-08-28		TDR	2013-02-25	JIF
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

Material:

Scale: 1:5

Format: A3

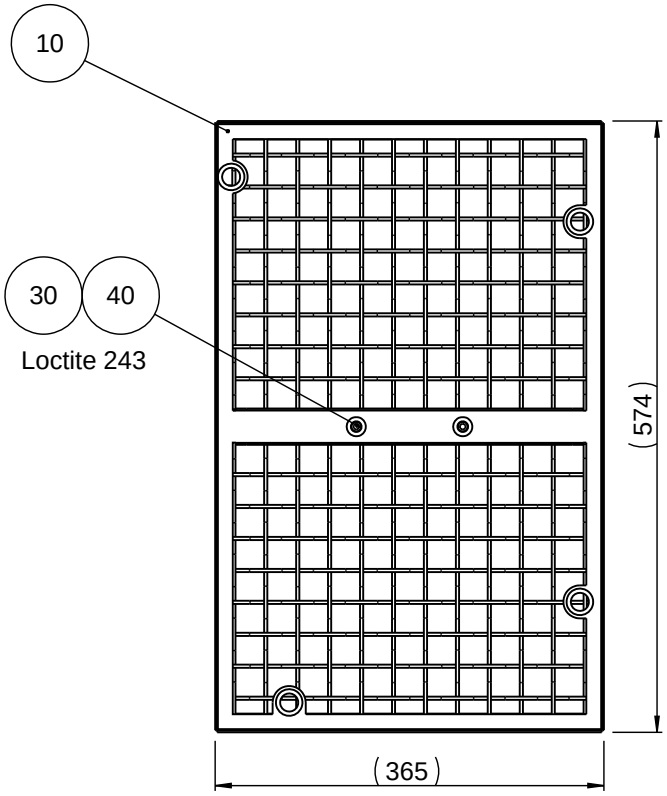
Tolerance: DS/ISO 2768- mK

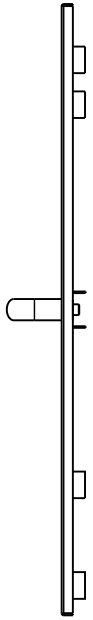
Weight : 48896.1 g

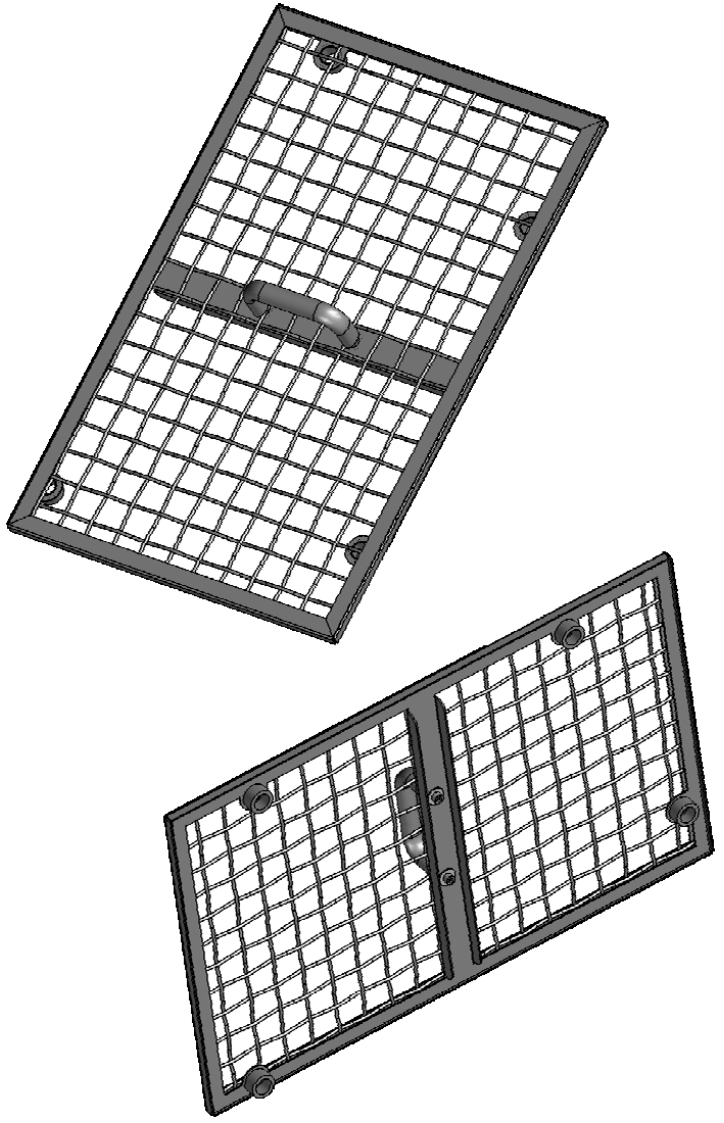
ID: Description:

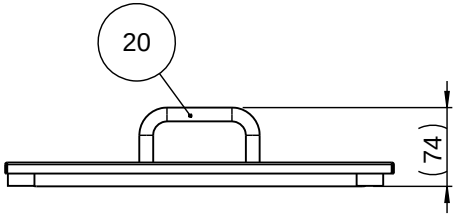
16140036 Cutting Table for X-table, assembled

Rev: E









B	2013-06-12	refresh view	TDR	2013-06-12	ABG
A	2012-11-27		SMI	2012-12-21	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Material:

Scale: 1:5

Format: A3

Tolerance: DS/ISO 2768- mK

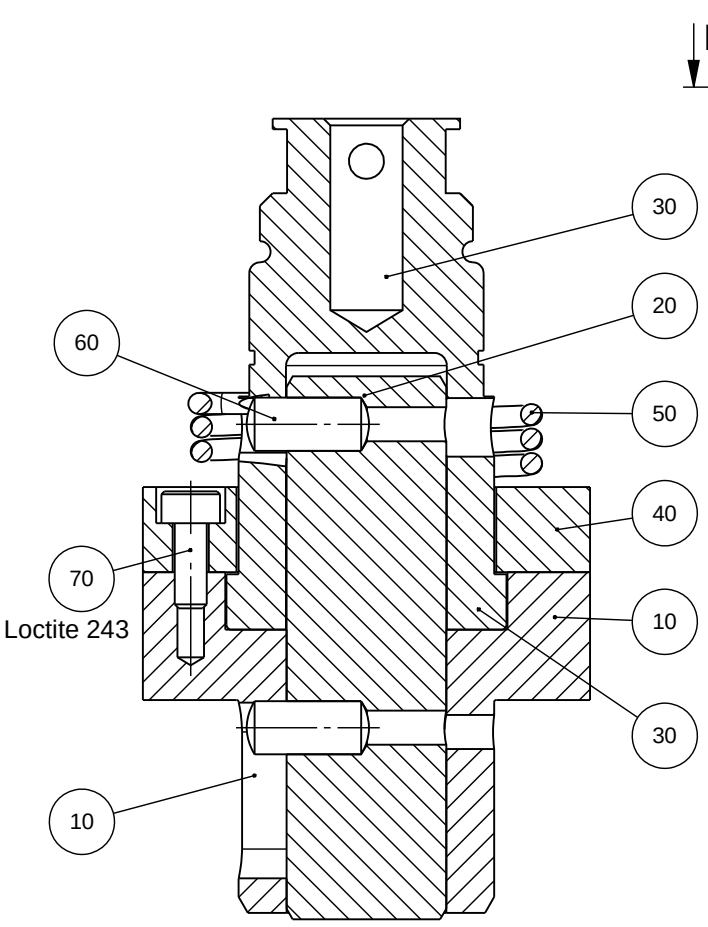
Weight : 2255.8 g

Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

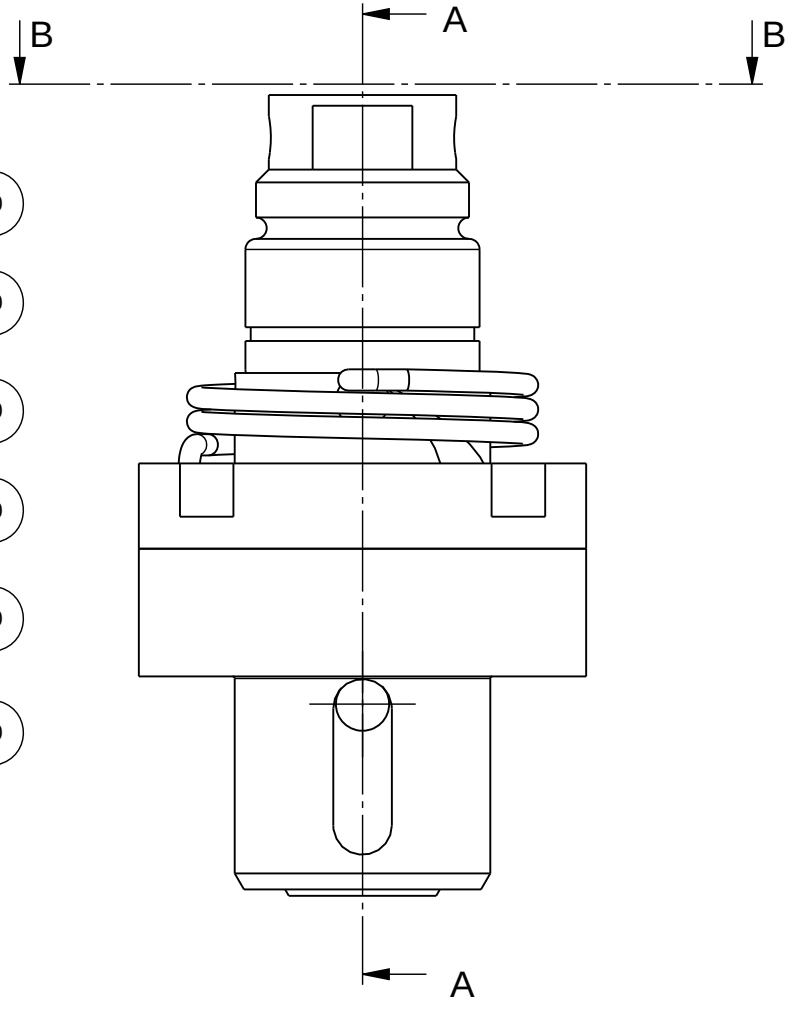
ID: Description:

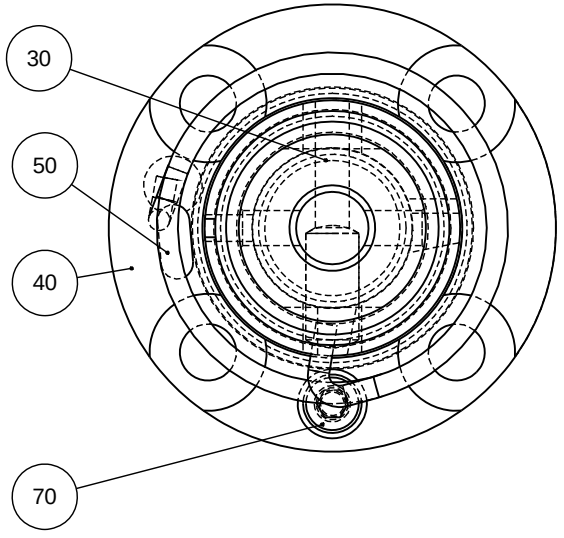
16140037 Left Net, assembled

Rev: **B**



SECTION A-A
SCALE 2 : 1





SECTION B-B

B	2013-05-29	added Loctite	ABG	2013-05-29	TDR
A	2012-11-21		TDR	2013-02-27	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Material:

Scale: **2:1**

Format: **A3**

Tolerance: DS/ISO 2768- mK

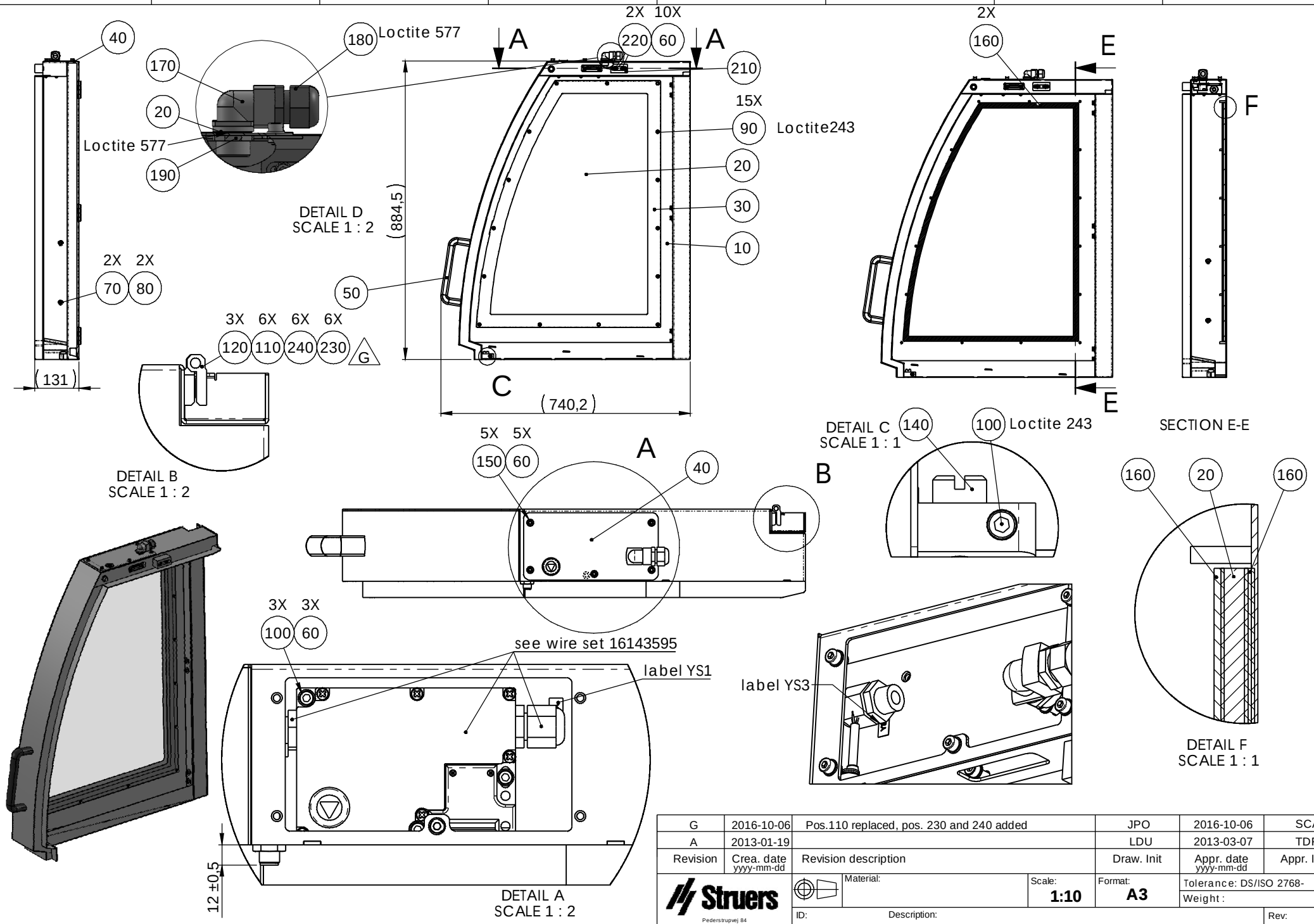
Weight : 342.9 g

Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

ID: Description:

16140039 Spindle lock, Assembled

Rev: **B**



G	2016-10-06	Pos.110 replaced, pos. 230 and 240 added	JPO	2016-10-06	SCA
A	2013-01-19		LDU	2013-03-07	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

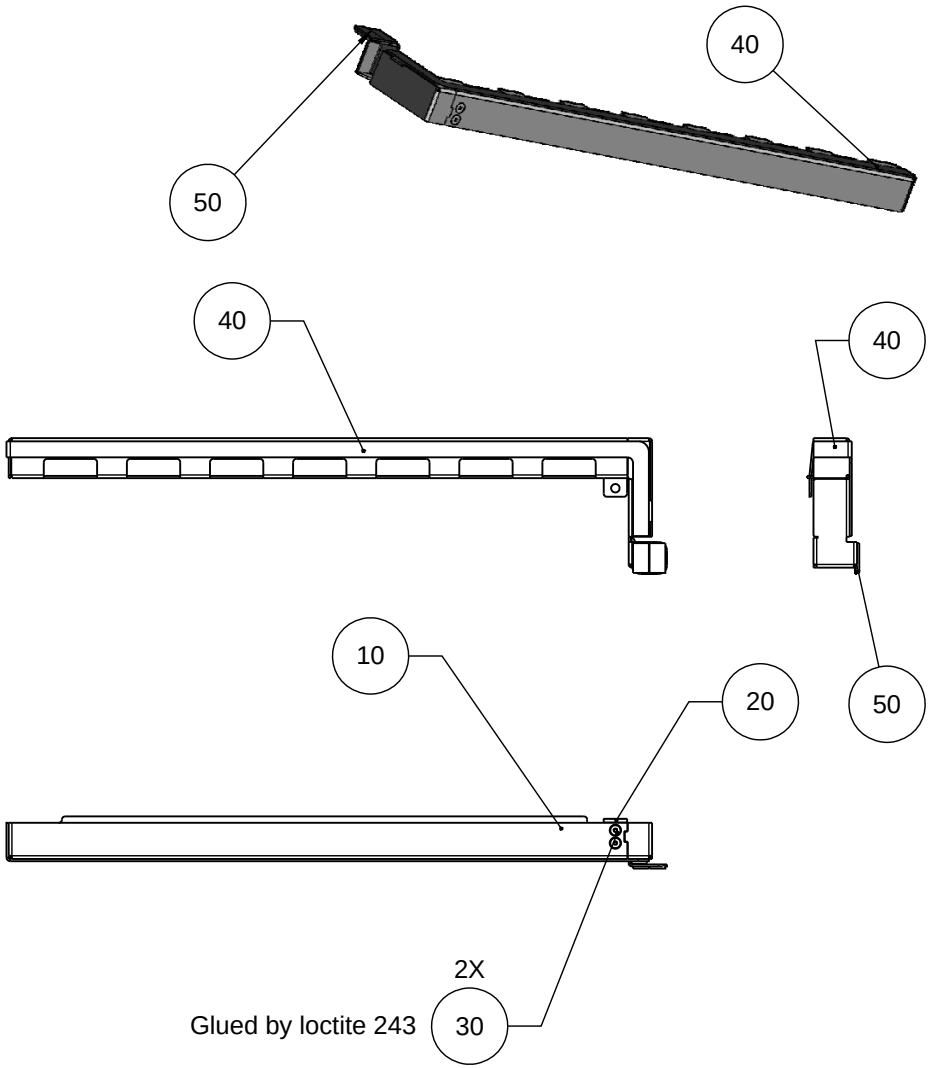
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:
Scale: 1:10
Format: A3
Tolerance: DS/ISO 2768- mK
Weight : g

ID: Description:

16140040 Side door, assembled

Rev: G



A					
A	2013-01-21		LDU	2013-01-21	TDR
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

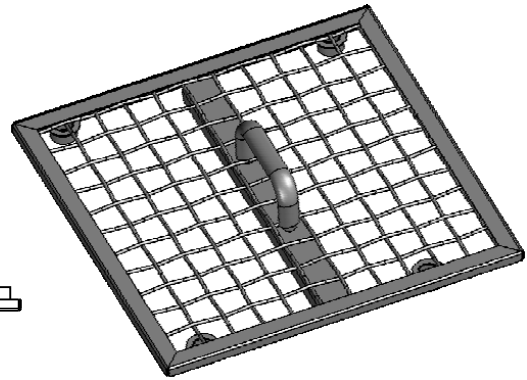
Material:	Scale: **1:5**	Format: **A4**	Tolerance: DS/ISO 2768 - mK	
			Weight : 1093.2 g	

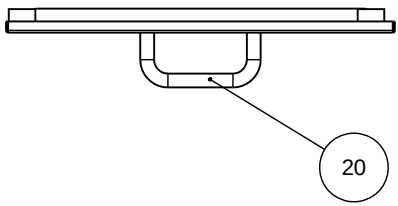
Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

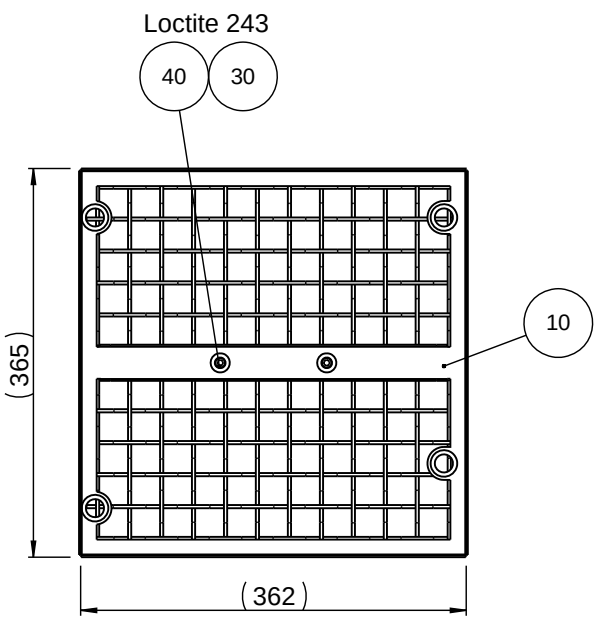
ID: Description:

16140041 Side door bottom labyrint, assembly

Rev: **A**







B	2013-06-12	refresh view	TDR	2013-06-12	ABG
A	2012-11-26		ABG	2012-12-21	TDR
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Material:

Scale: **1:5**

Format: **A4**

Tolerance: DS/ISO 2768 - mK

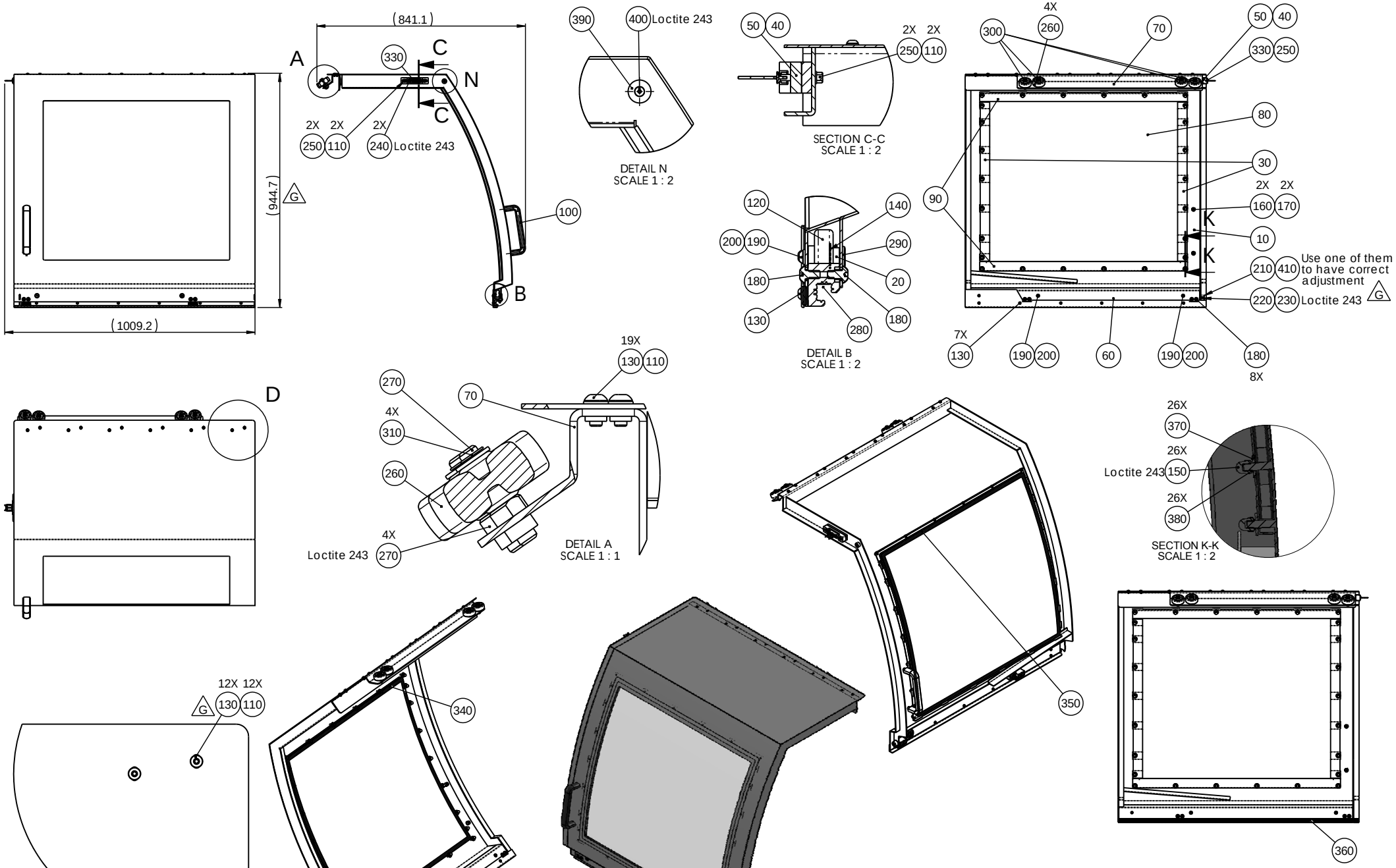
Weight : 1791.0 g

Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone : +45 44600 800
Fax : +45 44600 804

ID: Description:

16140042 Right Net, assembled

Rev: **B**

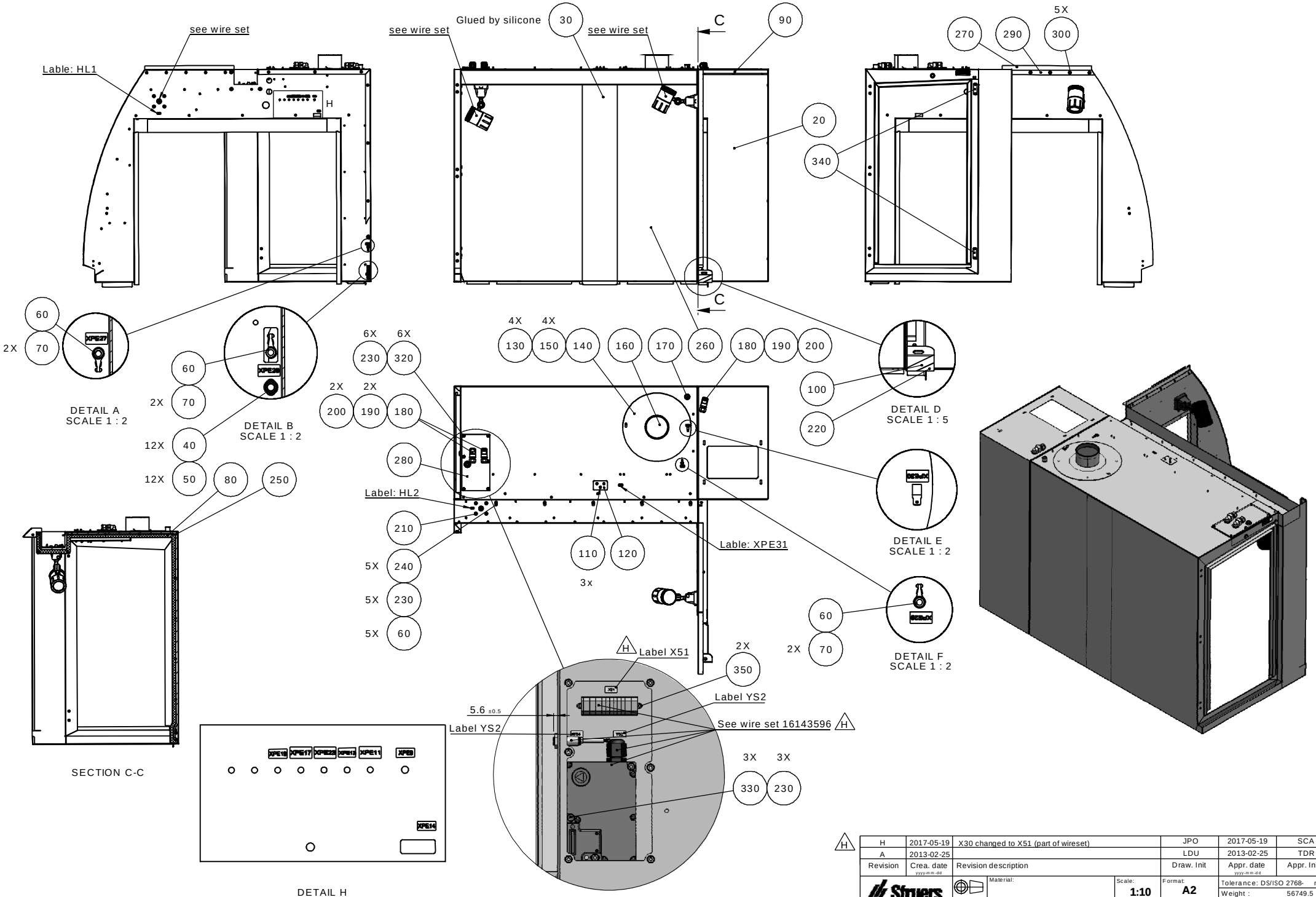


Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
G	2015-08-24	canceled pos.(320),chng.quant.pos.(130);add pos.(410)	JPO	2015-08-24	SCA
A	2012-08-20		JIF	2013-03-07	TDR

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:
Scale: 1:10
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : g

ID:
Description: **16140045 Front door, Assembled**
Rev: **G**

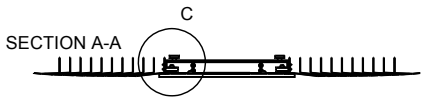


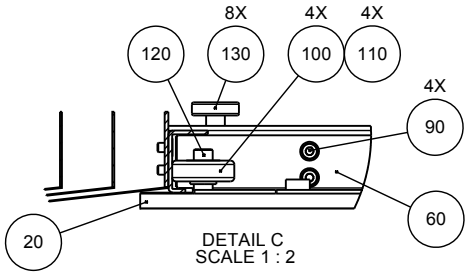
H	2017-05-19	X30 changed to X51 (part of wireset)	JPO	2017-05-19	SCA
A	2013-02-25		LDU	2013-02-25	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 801

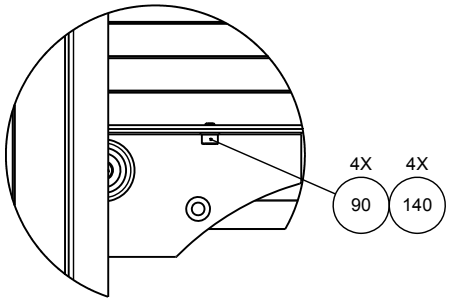
Material:
Scale: 1:10
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 56749.5 g

ID:
Description: 16140048 Chamber plates, assembled
Rev: H

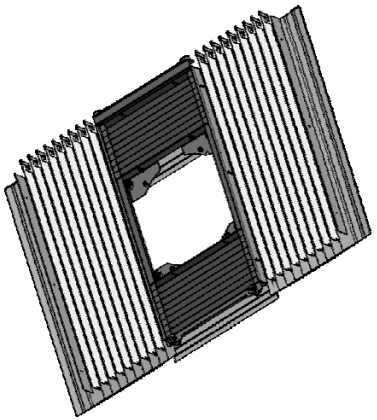


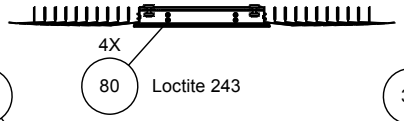


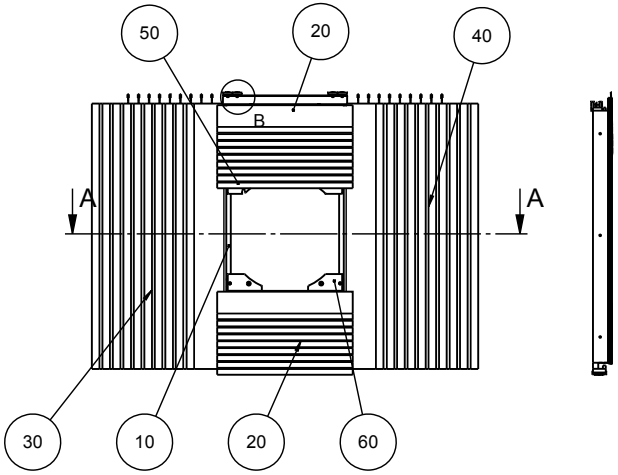
DETAIL C
SCALE 1 : 2

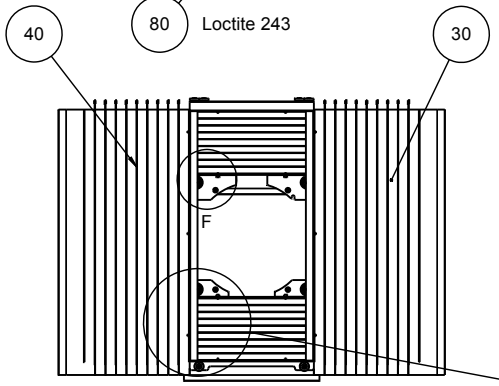


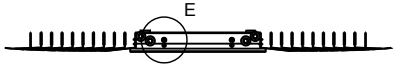
DETAIL F
SCALE 1 : 2

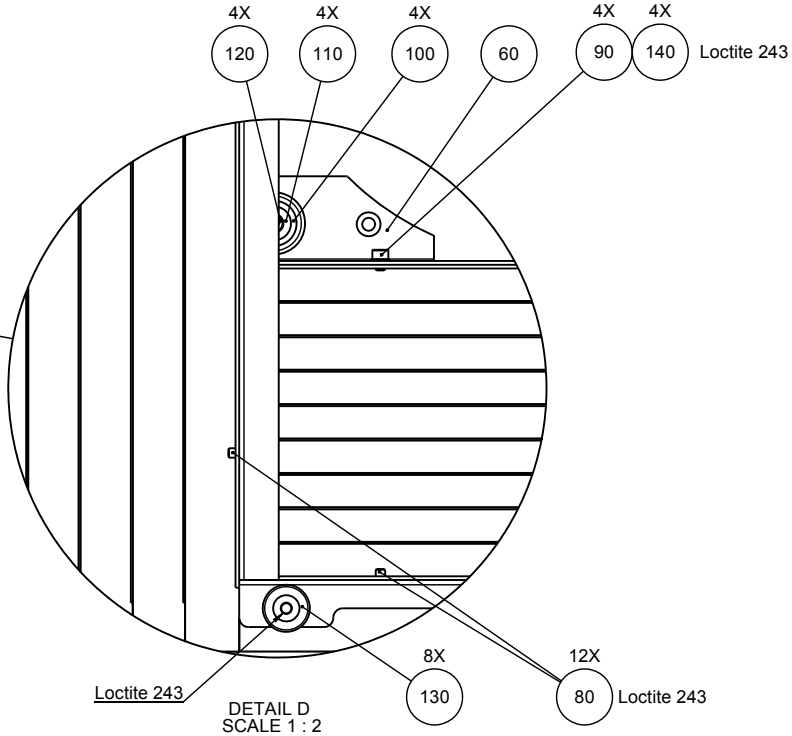




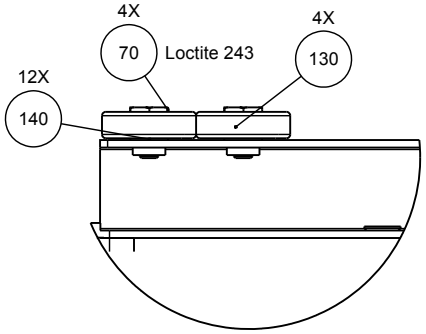




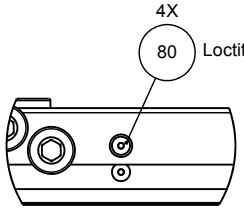




DETAIL D
SCALE 1 : 2



DETAIL B
SCALE 1 : 1



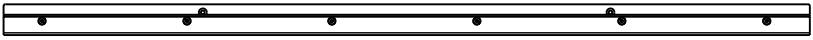
DETAIL E
SCALE 1 : 2

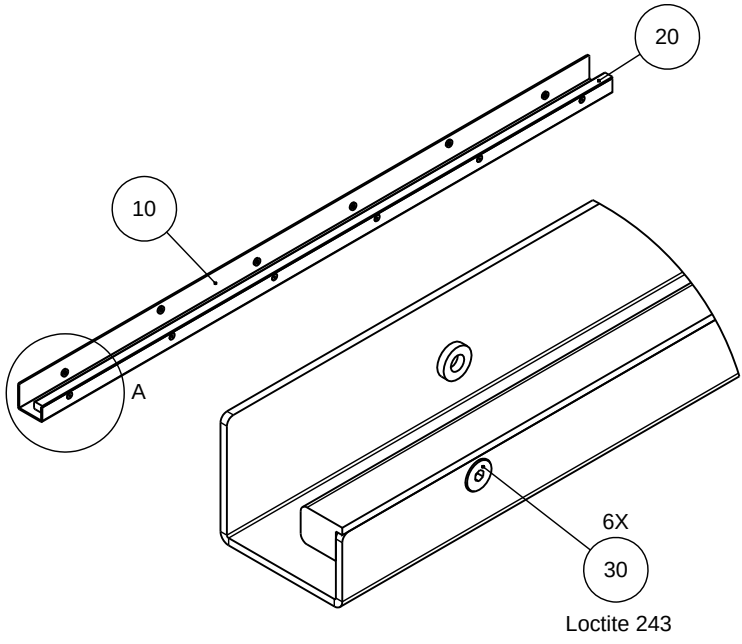
E	2014-01-23	change quantity pos.140	LDU	2014-01-24	ABG
A	2012-11-26		ABG		
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:
Scale: 1:10
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 17619.2 g

ID:
Description: **16140050 Chamber Bellows, assembled**
Rev: **E**





Rev	Crea. date (yyyy-mm-dd)	Revision description			
A					
A	2012-11-30		LDU	2012-12-21	TDR
Rev	Crea. date (yyyy-mm-dd)	Revision description	Draw. Init	Appr. date (yyyy-mm-dd)	Appr. Init

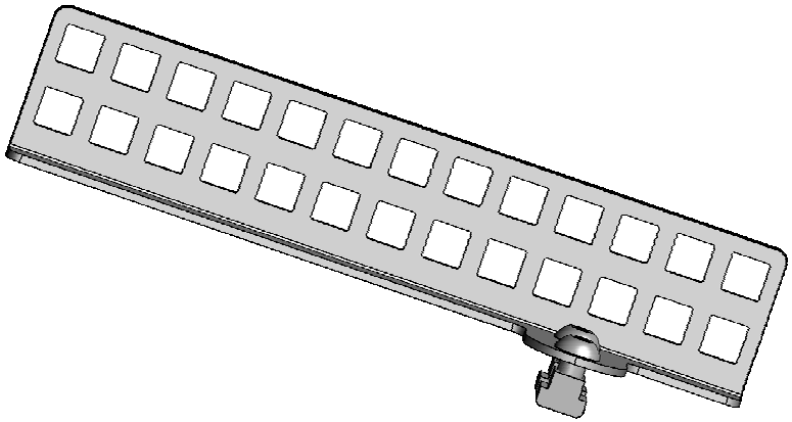
Material:	Scale:	Format:	Tolerance: DS/ISO 2768 - mK
	1:5	A4	Weight : 1350.4 g

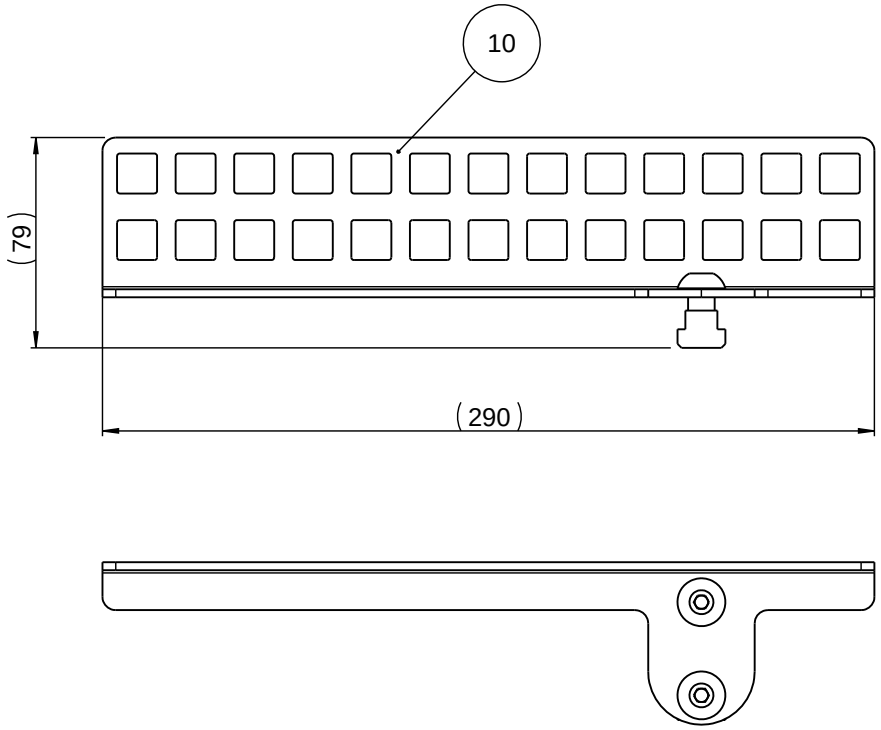
Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

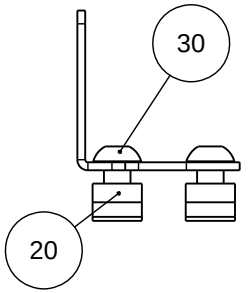
ID: Description:

16140053 Upper Profile, Bellows, assembled

Rev: **A**







D	2013-09-02	views are refreshed	TDR	2013-09-02	ABG
A	2013-04-18		ABG	2013-04-19	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Material:	Scale: 1:2	Format: A3	Tolerance: DS/ISO 2768- mK	
			Weight : 413.5 g	

Pederstrupvej 84
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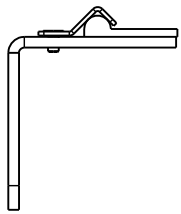
Phone:+45 44 600 800
Fax: +45 44 600 804

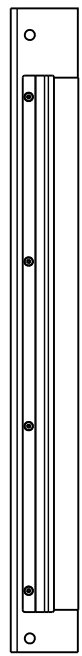
ID: Description:

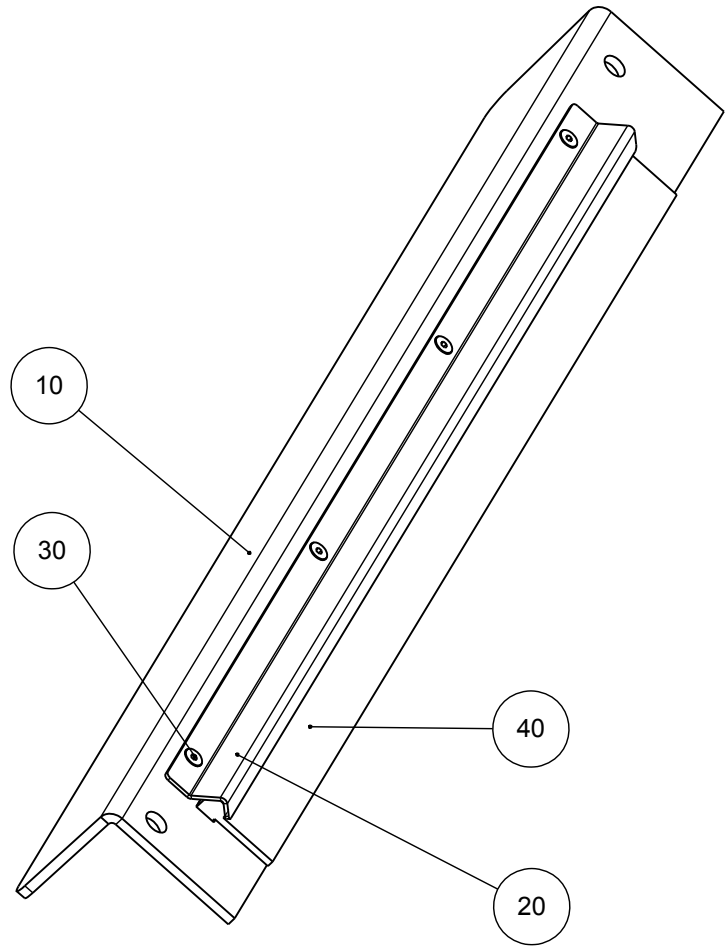
16140058 Sample barrier Left, assembled

Rev: **D**



SCALE 1 : 2





B	2016-02-01	replaced item No.pos.(40)	ABG	2016-02-01	SCA
A	2012-12-05		TDR	2013-03-08	ABG
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
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Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

Material:

Scale: **1:5**

Format: **A4**

Tolerance: DS/ISO 2768 - mK

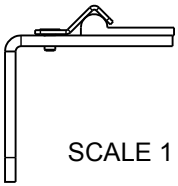
Weight : 2249.8 g

ID:

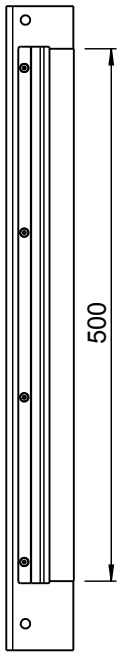
Description:

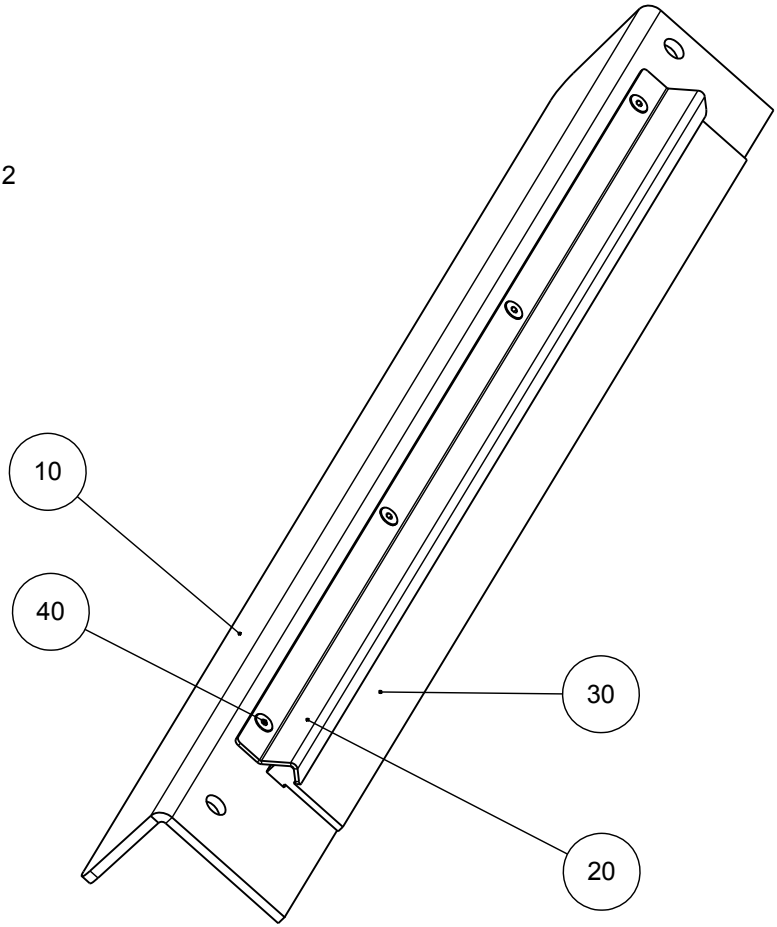
16140061 Protection Shield 1, assembled

Rev: **B**



SCALE 1 : 2





C	2016-02-01	replaced item pos.(30)	ABG	2016-02-01	SCA
A	2012-12-05		TDR	2013-03-08	ABG
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

Material:

Scale: **1:5**

Format: **A4**

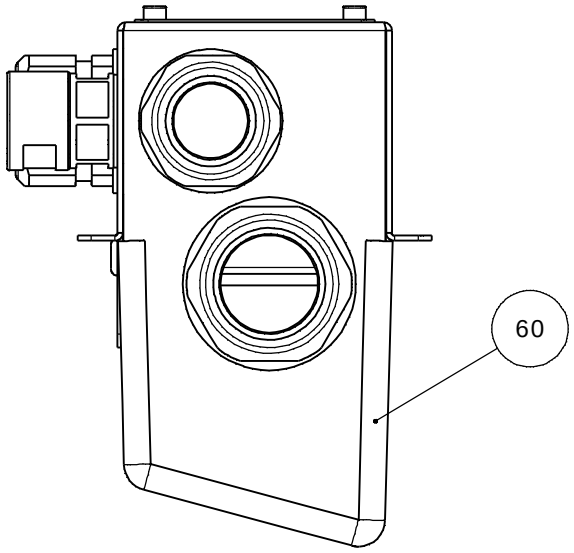
Tolerance: DS/ISO 2768 - mK

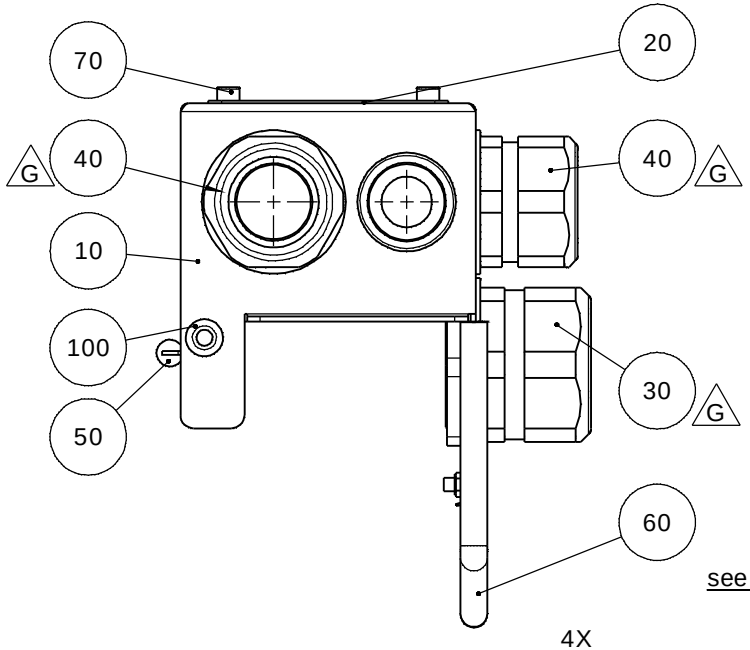
Weight : 2062.0 g

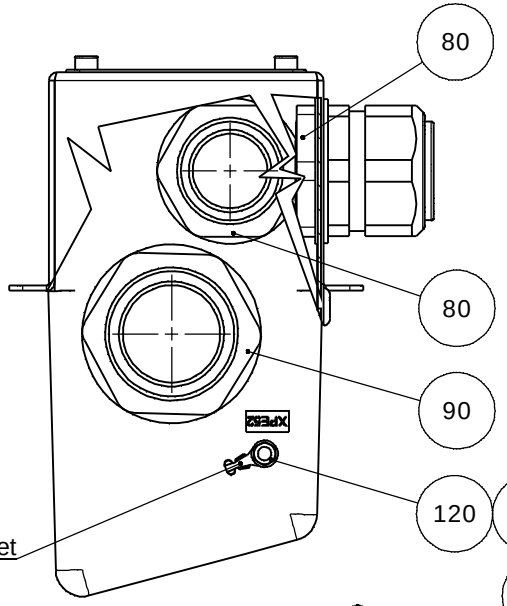
ID: Description:

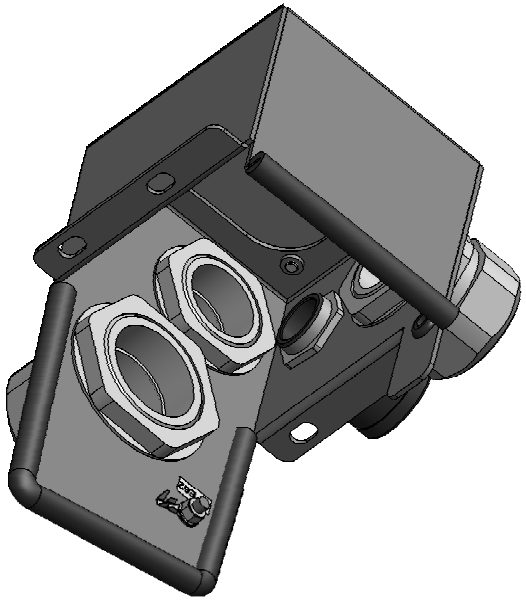
16140062 Protection Shield 2, assembled

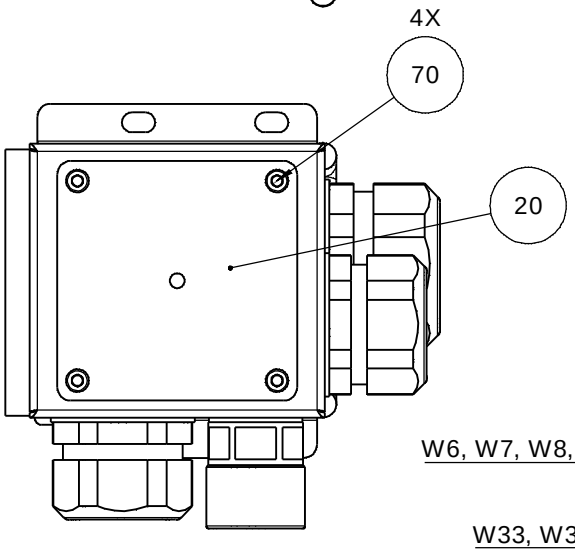
Rev: **C**

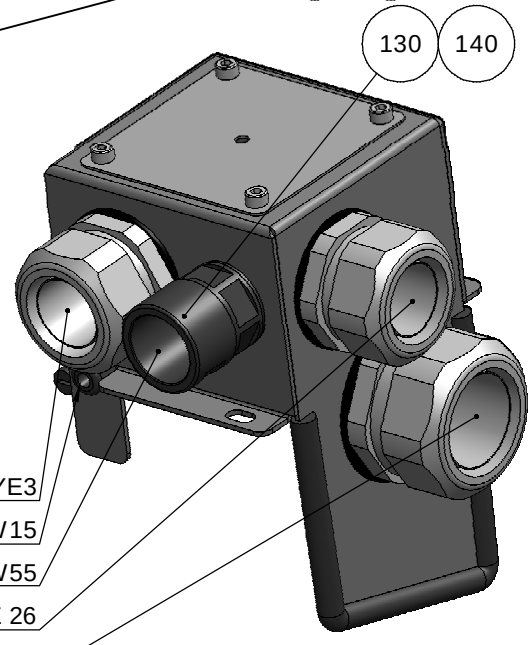












W6, W7, W8, W9, W11, W25, GNYE3

W15

W33, W34 W50, W51, W53, W55

W3, W8, W9, W12, W13, W15, W16, W17, W55, GNYE 26

W2+GNYE3+GNYE4+W6, W4, W7, W50, W54, W57

G	2017-10-20	Cable glands changed to another type	JPO	2017-10-20	SCA
A	2013-01-24		ABG	2013-03-04	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
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Phone: +45 44 600 800
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Material:

Scale: 1:2

Format: A3

Tolerance: DS/ISO 2768- mK

Weight: 1059.6 g

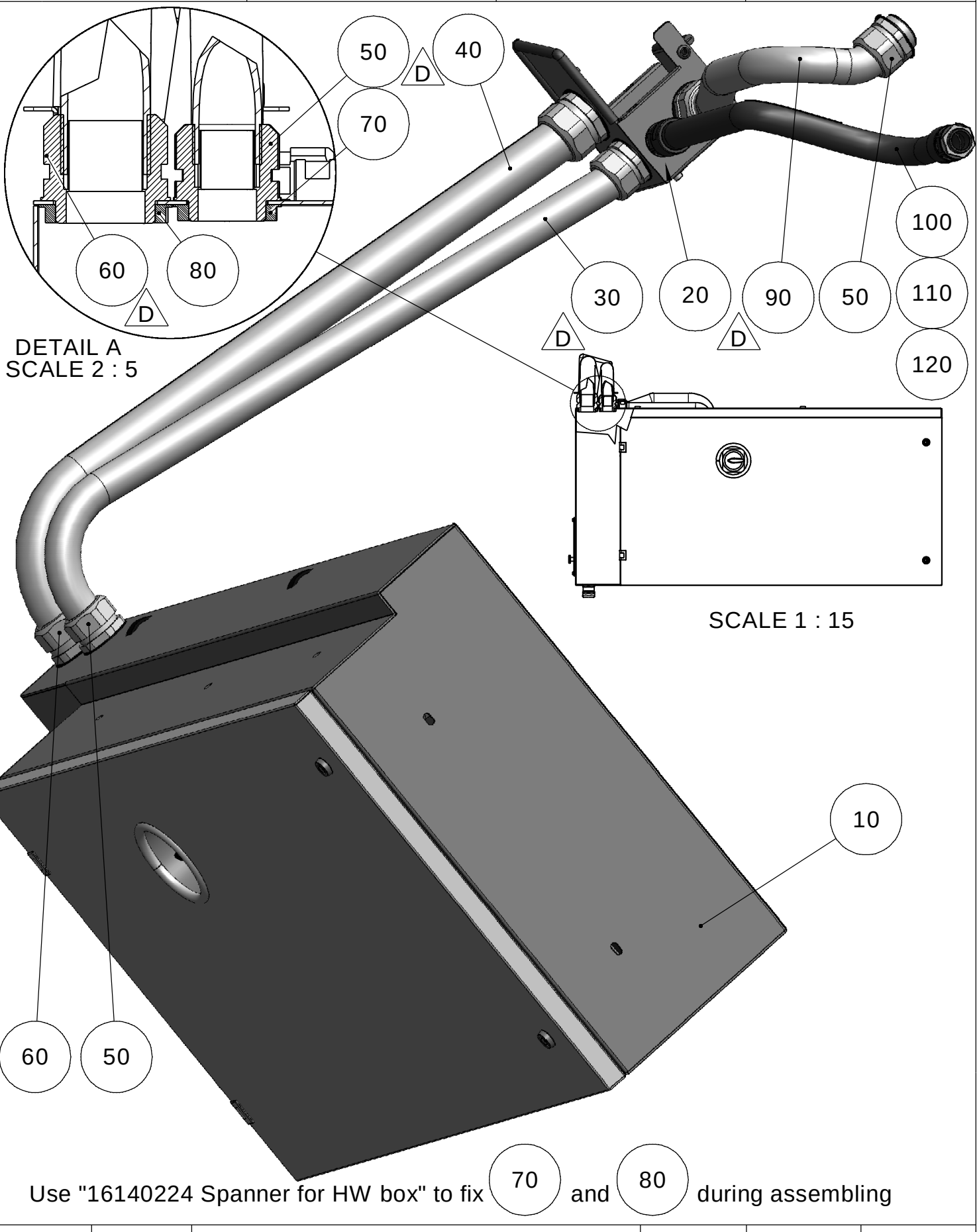
ID:

Description:

16140064 Protection Cover, assembled

Rev: G

DETAIL A
SCALE 2 : 5



SCALE 1 : 15

Use "16140224 Spanner for HW box" to fix 70 and 80 during assembling

D	2017-10-20	Cable glands and hoses changed	JPO	2017-10-20	SCA
A	2013-06-12		TDR	2013-06-12	ABG
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
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Copenhagen
Denmark
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Fax : +45 44600 804

Material:

Scale: **1:5**

Format: **A4**

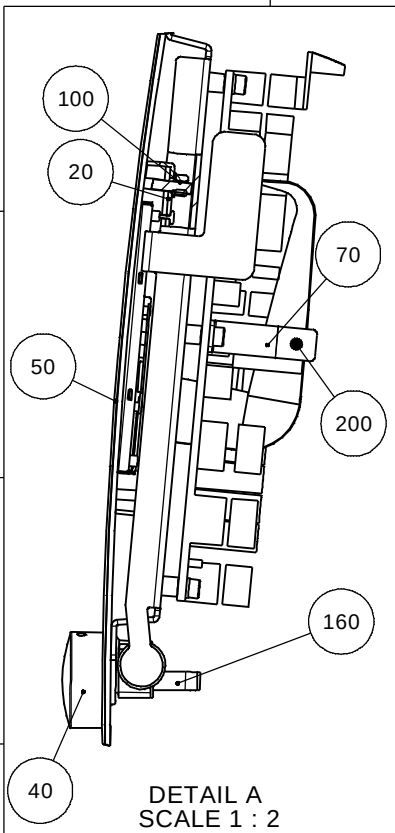
Tolerance: DS/ISO 2768 - mK

Weight : 50479.7 g

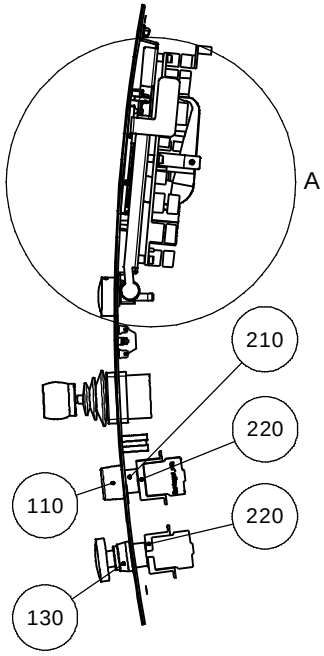
ID: Description:

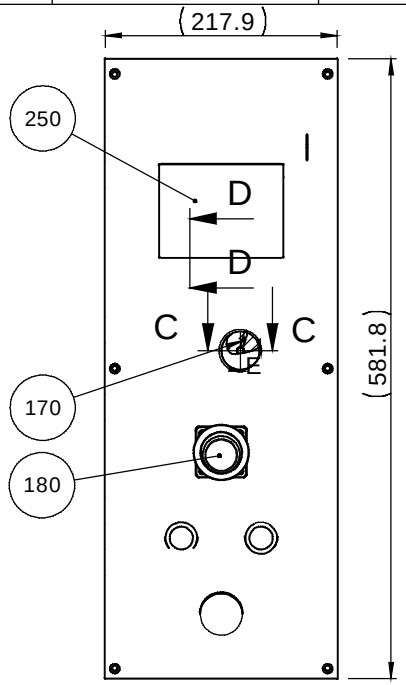
16140068 HW box and hoses, assembled

Rev: **D**

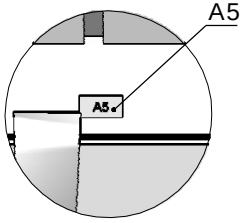


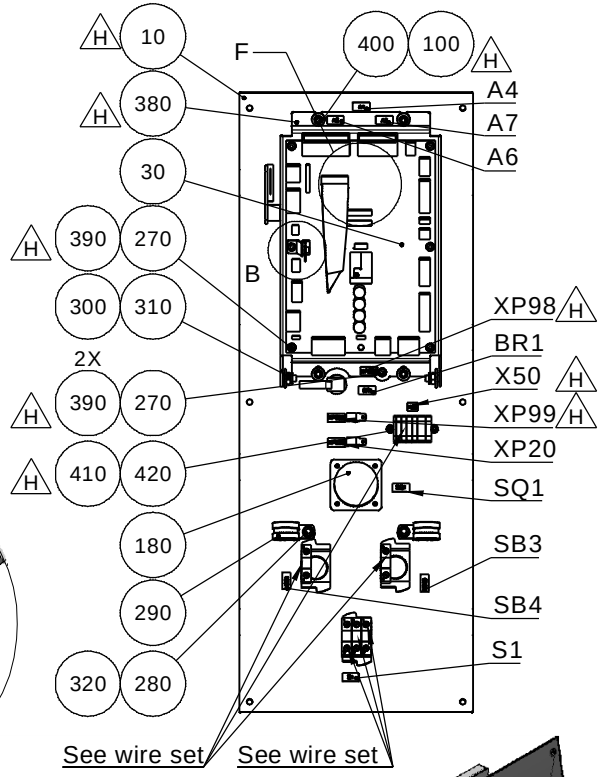
DETAIL A
SCALE 1 : 2

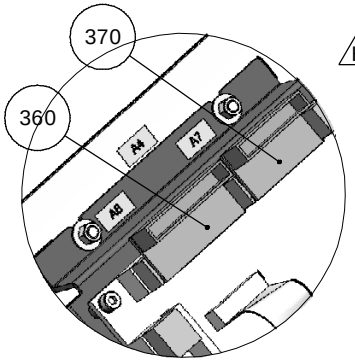




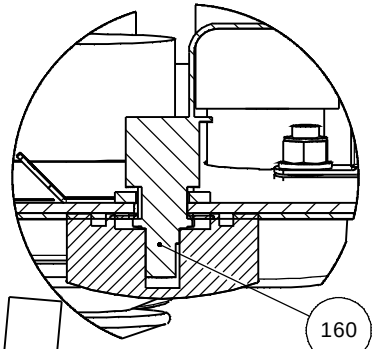
DETAIL F
SCALE 1 : 2



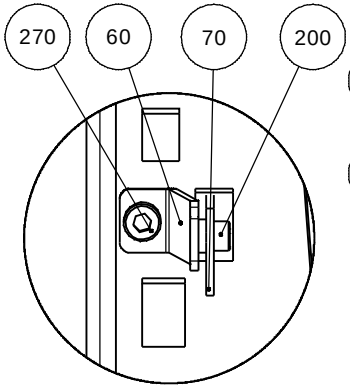




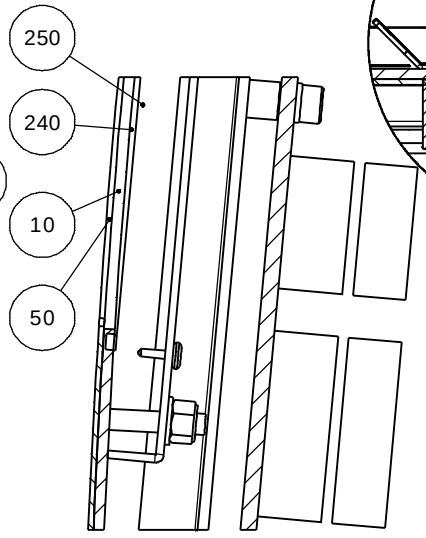
DETAIL J
SCALE 1 : 2



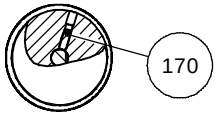
SECTION C-C
SCALE 1 : 1



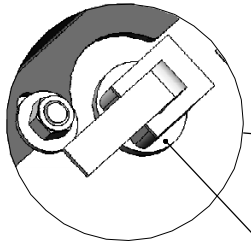
DETAIL B
SCALE 1 : 1



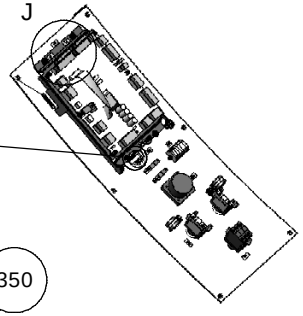
SECTION D-D
SCALE 1 : 1

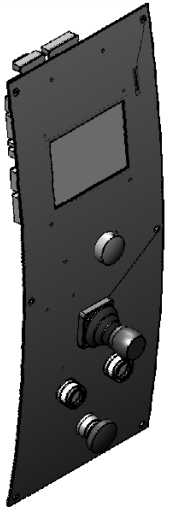


DETAIL E
SCALE 1 : 2



DETAIL G
SCALE 1 : 1





H	2017-05-19	Pos.10 replaced, added pos.380 + fasteners change	JPO	2017-05-19	SCA
A	2012-11-30		LDU	2013-03-08	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
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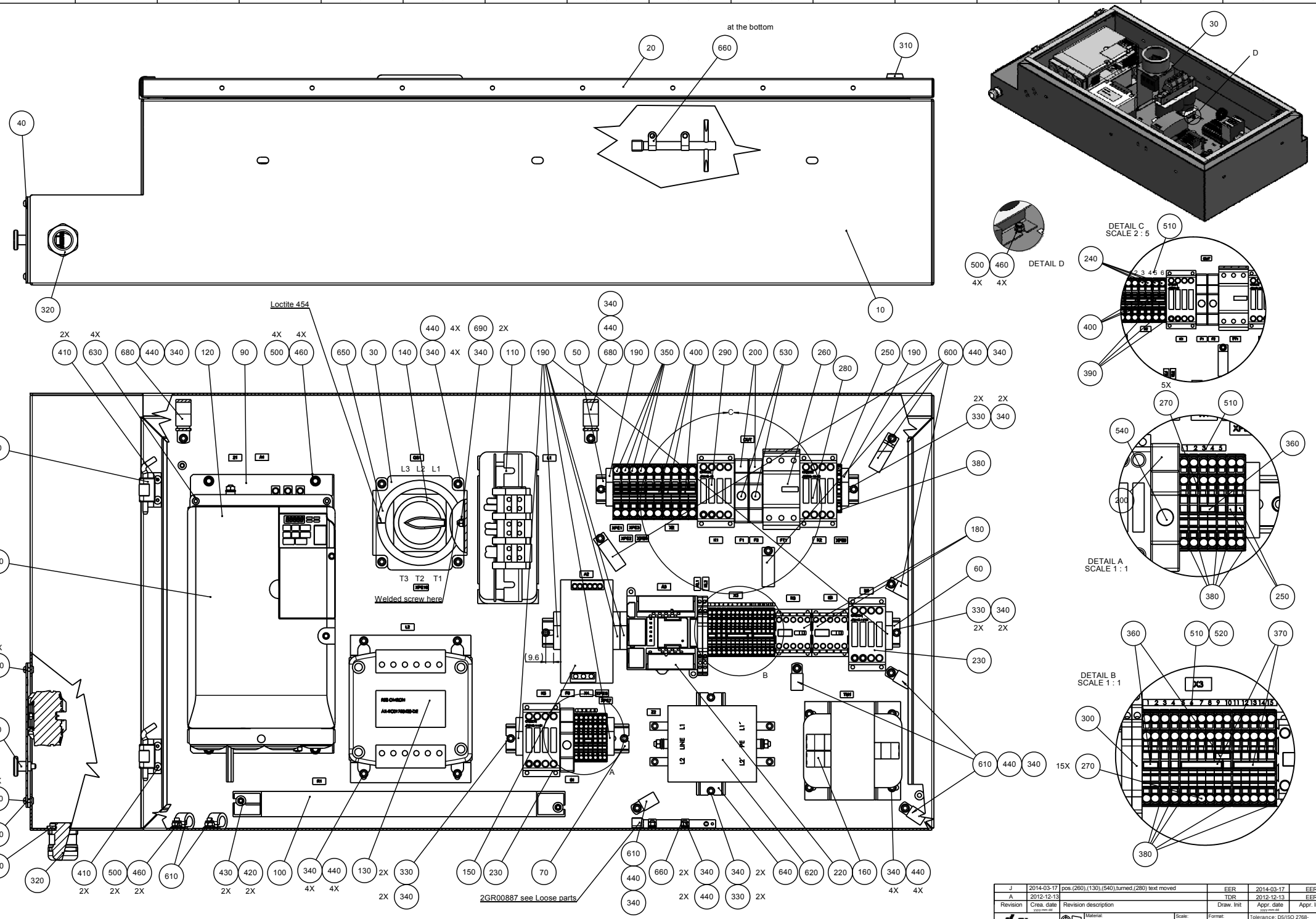
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:	Scale:	Format:	Tolerance: DS/ISO 2768- mK
	1:5	A3	Weight : g

ID: Description:

16140071 Front panel, assembly

Rev: **H**

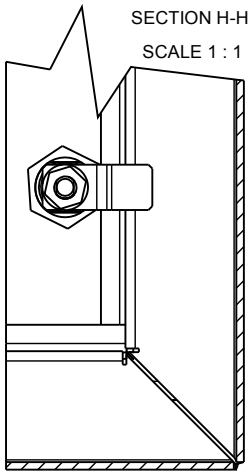


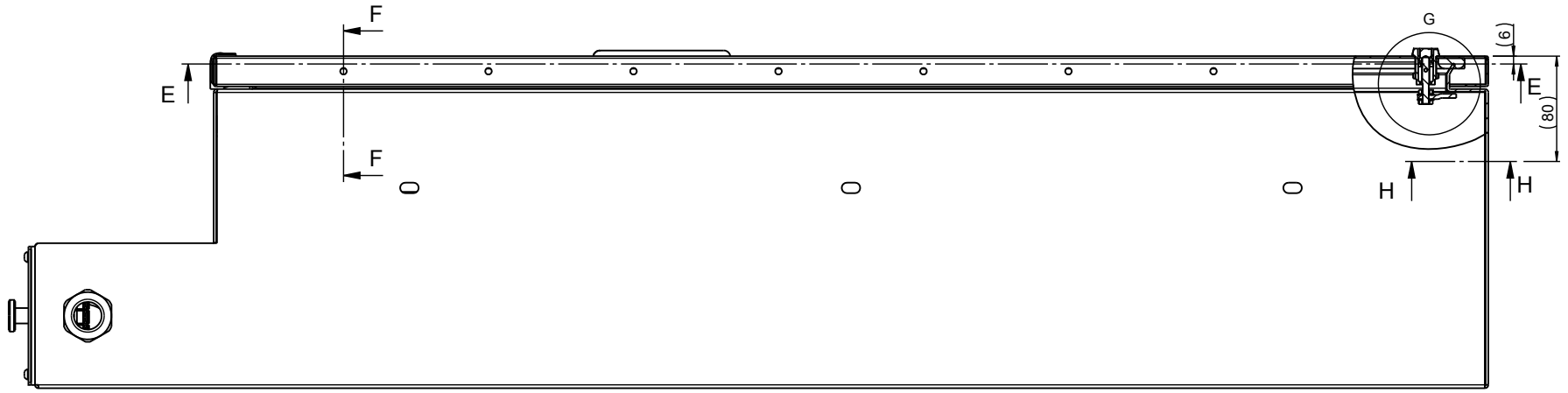
J	2014-03-17	pos.(260),(130),(540),turned,(280) text moved	EER	2014-03-17	EER
A	2012-12-13		TDR	2012-12-13	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

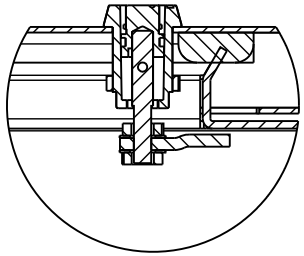
Struers — Pederstrupvej 84, DK-2750 Ballerup/Copenhagen, Denmark, Phone +45 44 600 800, Fax +45 44 600 801

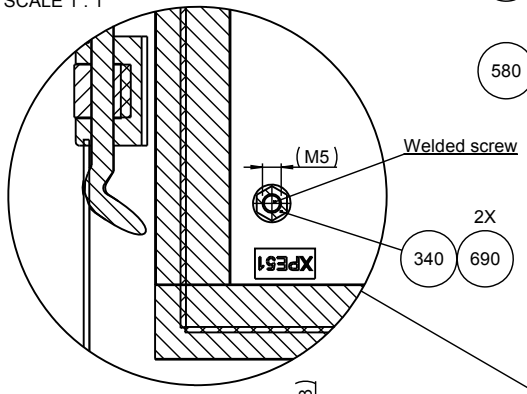
Material: | Scale: 1:2 | Format: A1 | Tolerance: DS/ISO 2768- mK | Weight : 48003.9 g

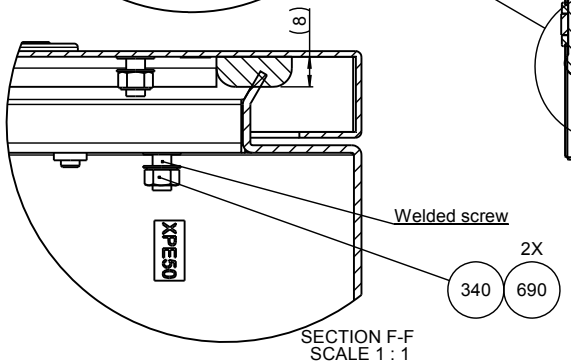
ID: | Description: **16140075 HW box and parts, assembly** | page 1/2 | Rev.: J

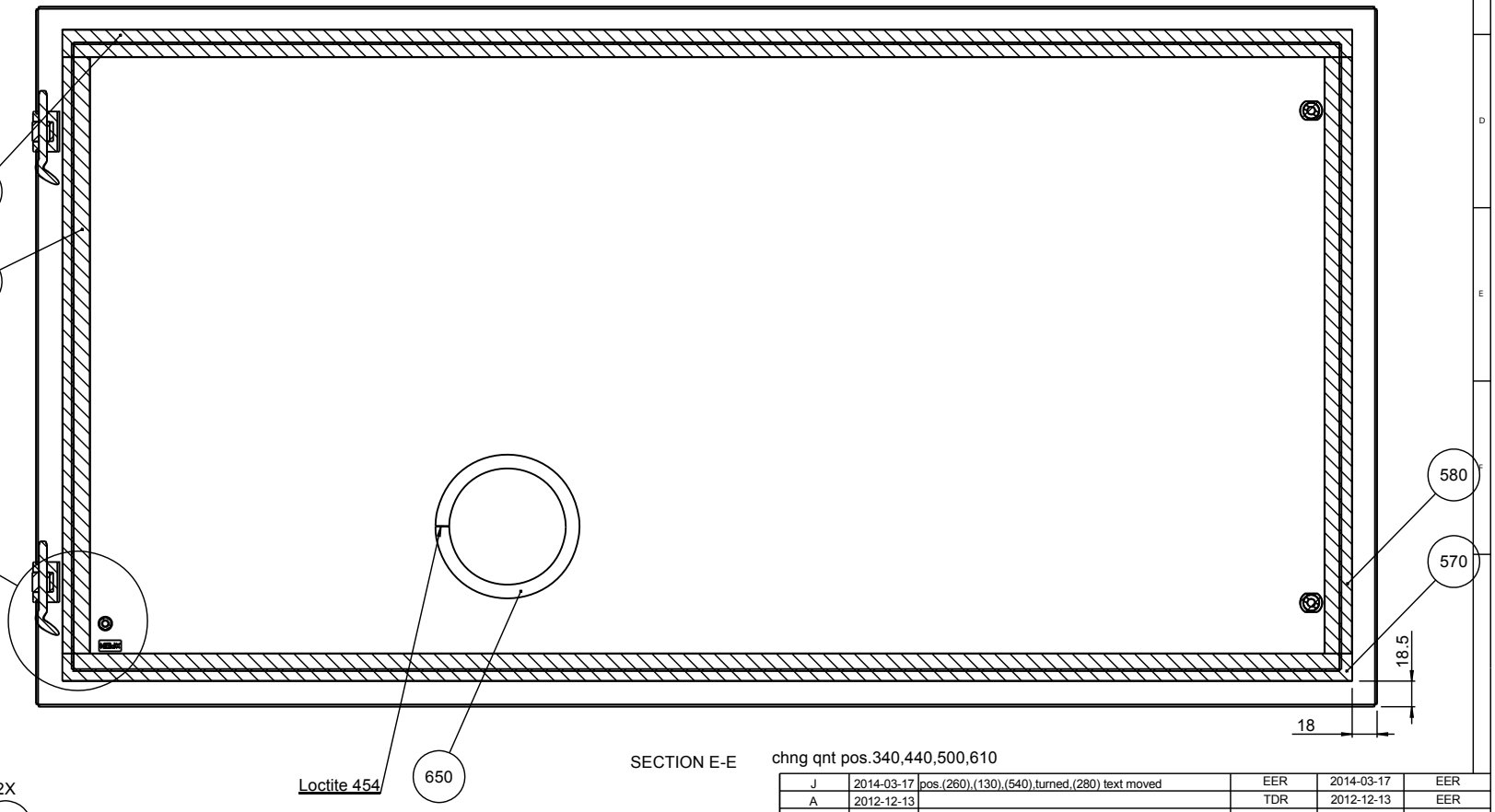












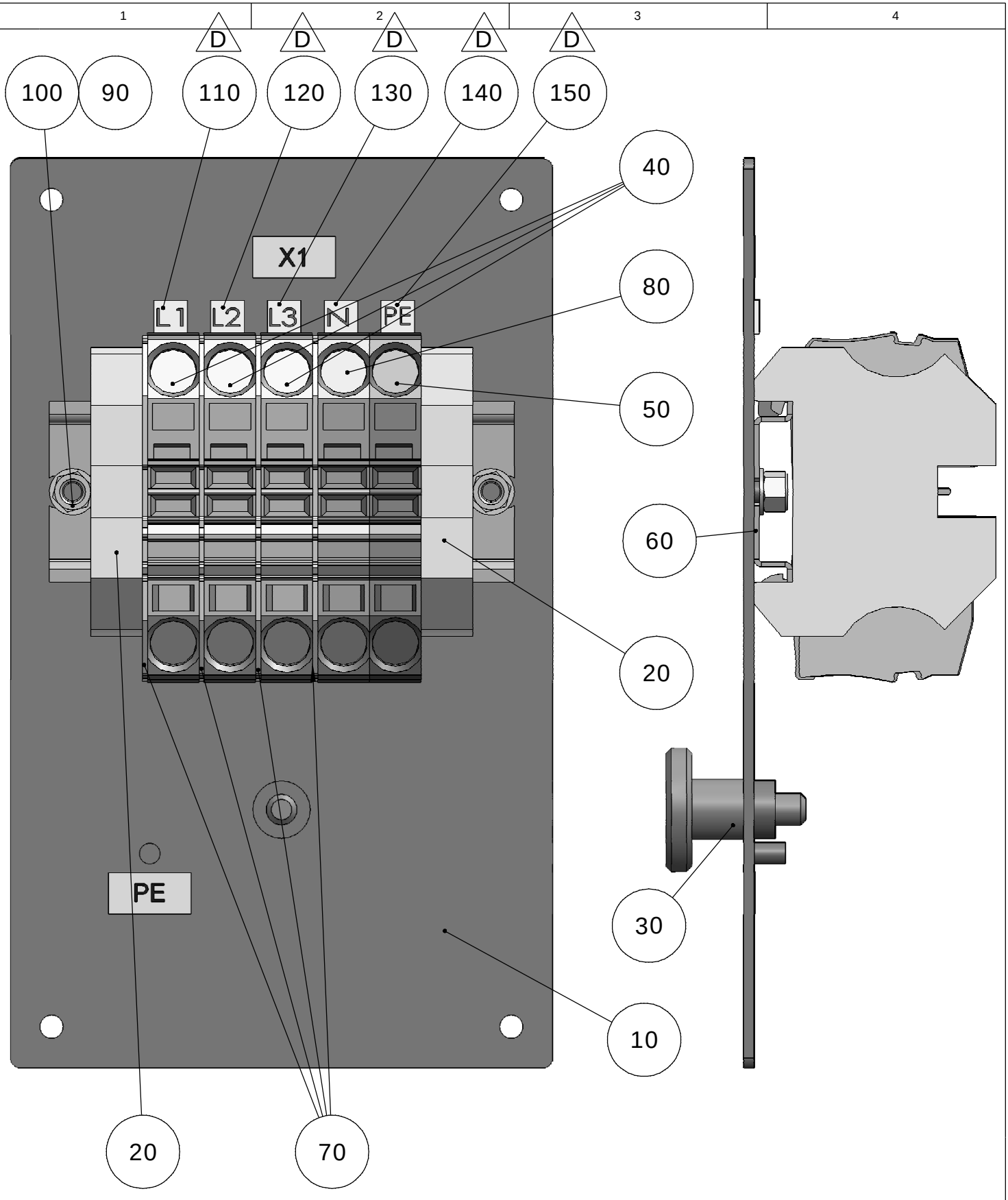
chng qnt pos.340,440,500,610

J	2014-03-17	pos.(260),(130),(540),turned,(280) text moved	EER	2014-03-17	EER
A	2012-12-13		TDR	2012-12-13	EER
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:
Scale: 2:5
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 48003.9 g

ID:
Description: **16140075 HW box and parts, assembly**
page 2/2
Rev: **J**



Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init
D	2017-05-22	Labels (pos.110-150) added	JPO	2017-05-22	SCA
A	2013-1-11		ABG	2012-12-12	TDR

Struers
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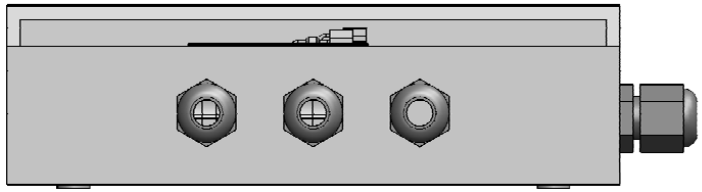
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

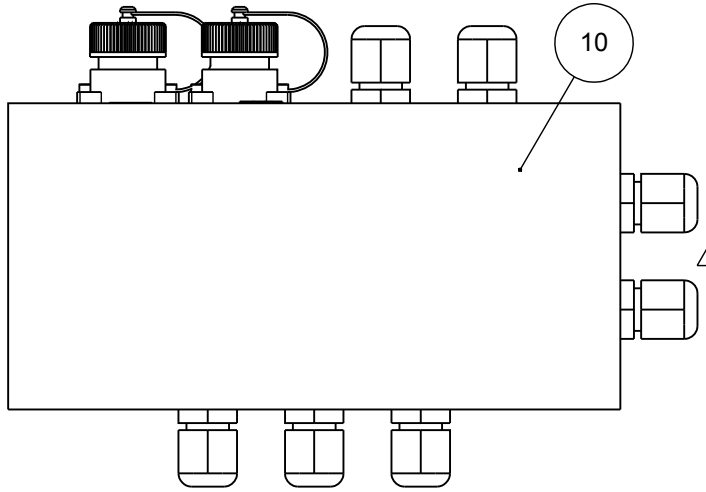
Material:	Scale:	Format:	Tolerance: DS/ISO 2768 - mK
	1:1	A4	Weight : 741.5 g

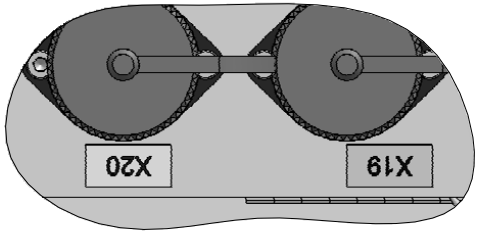
ID: Description:

16140076 Power supply, assembled

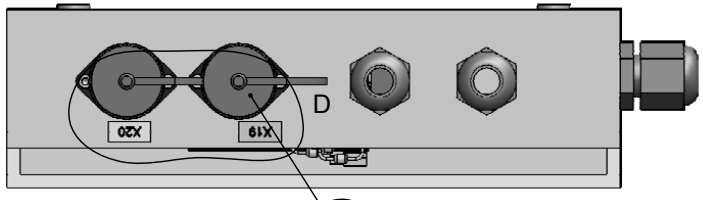
Rev: D

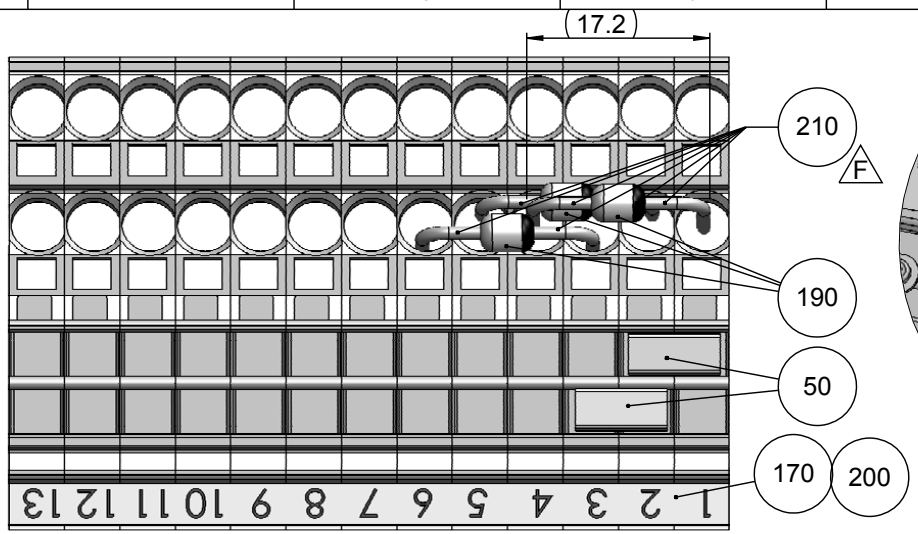




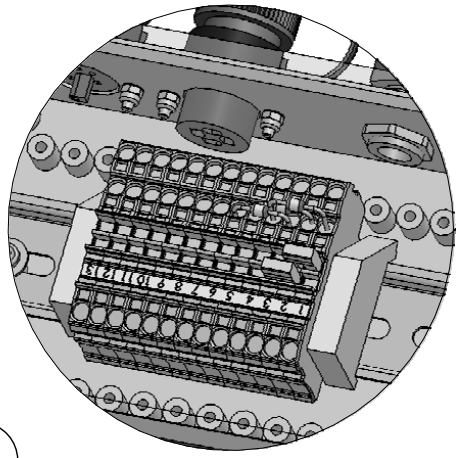


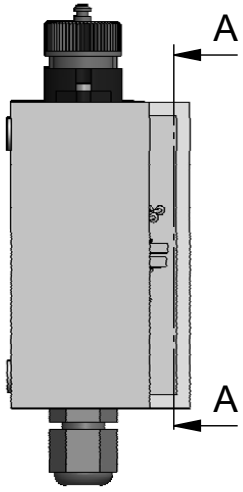
DETAIL D
SCALE 1 : 1

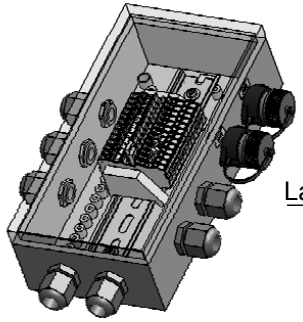


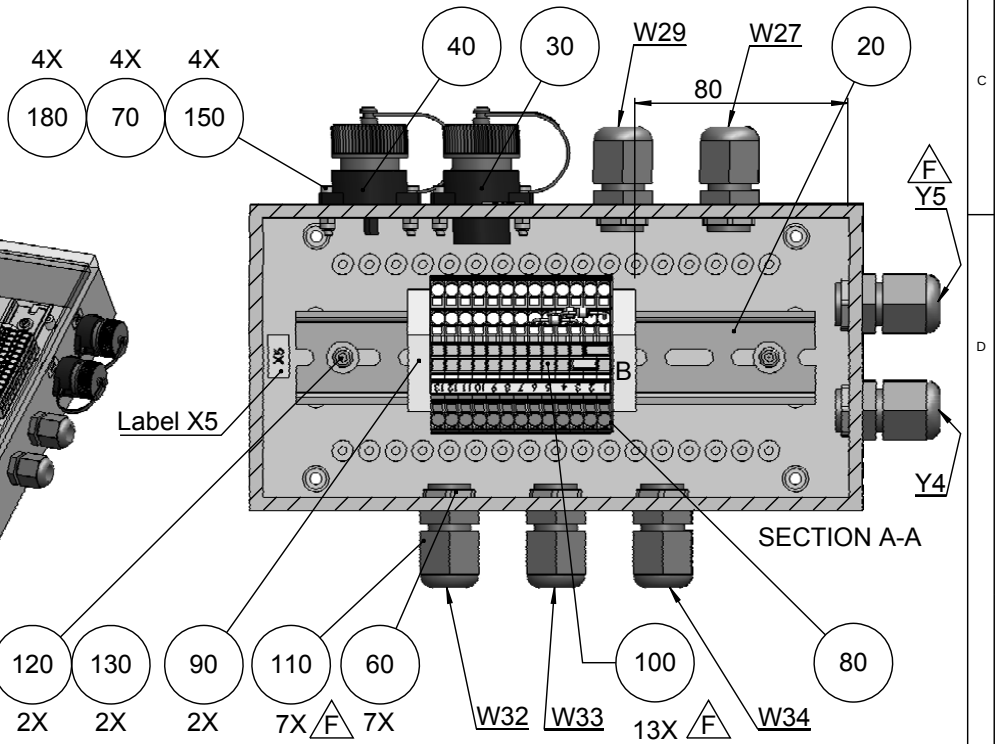


DETAIL B
SCALE 2 : 1









F

F	2015-09-24	changed quantity of pos. 60,100,110,add pos.210	JPO	2015-09-24	SCA
A	2013-05-27		ABG	2013-05-27	TDR
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

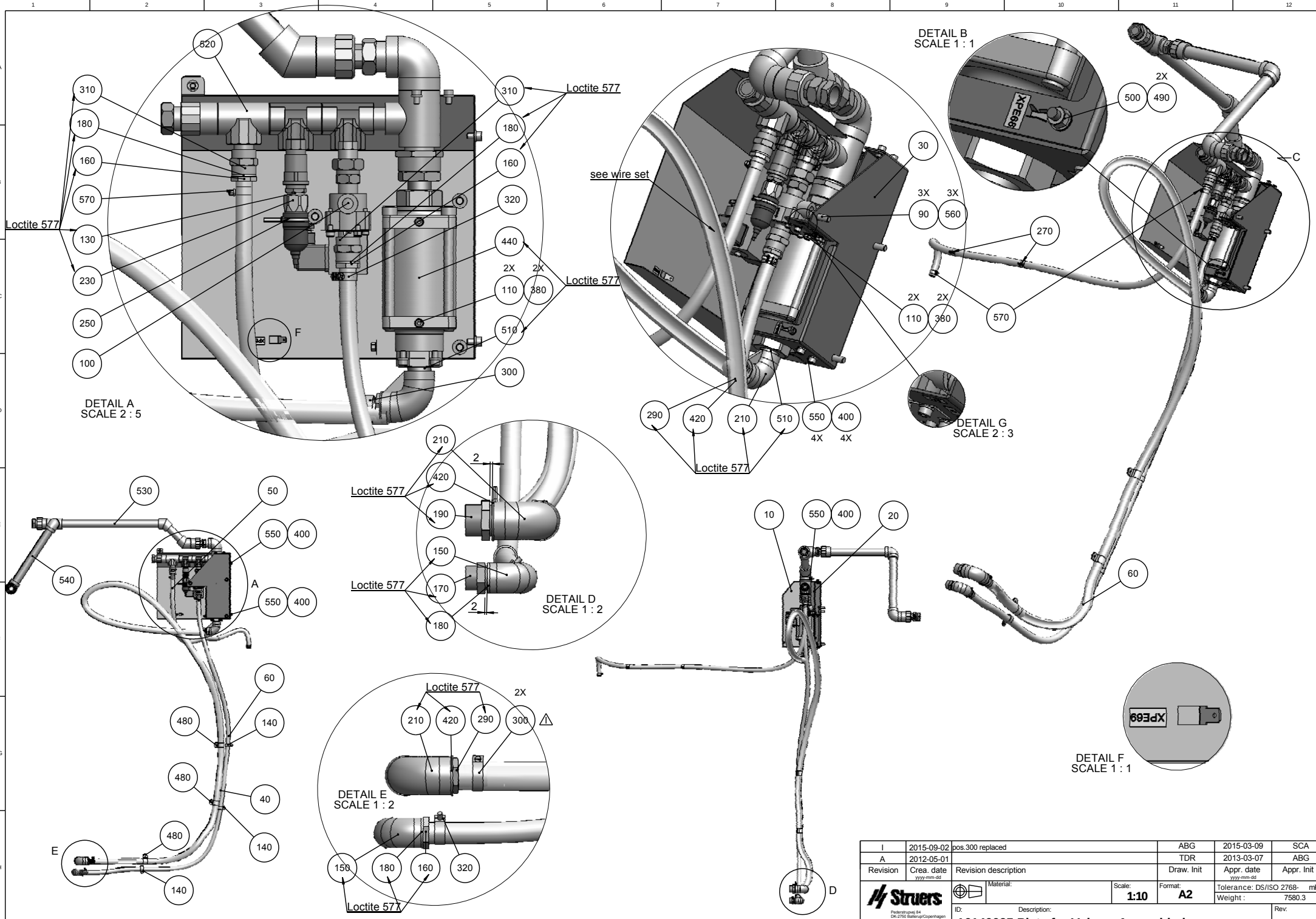
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

Material:	Scale: 1:2	Format: A3	Tolerance: DS/ISO 2768- mK	
			Weight : 826.3 g	

ID: Description:

16140077 X-table Connection Box

Rev: **F**

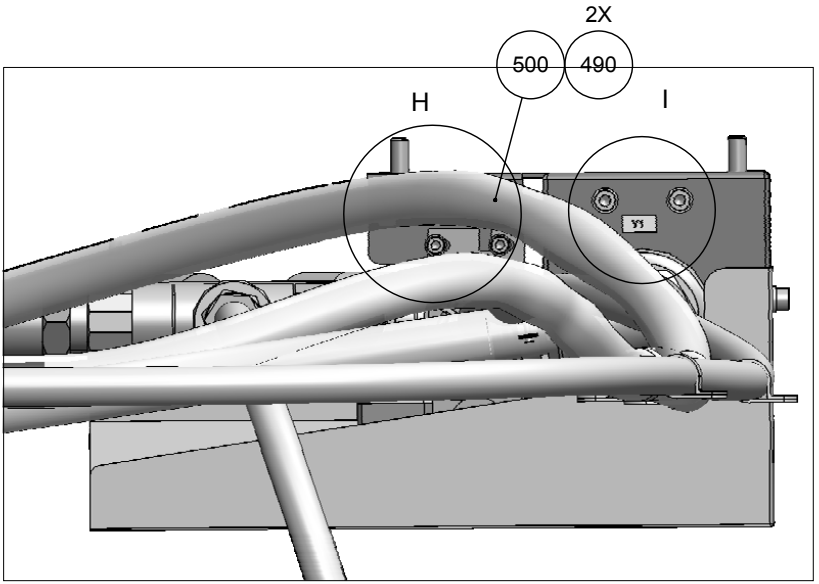


I	2015-09-02	pos.300 replaced	ABG	2015-03-09	SCA
A	2012-05-01		TDR	2013-03-07	ABG
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

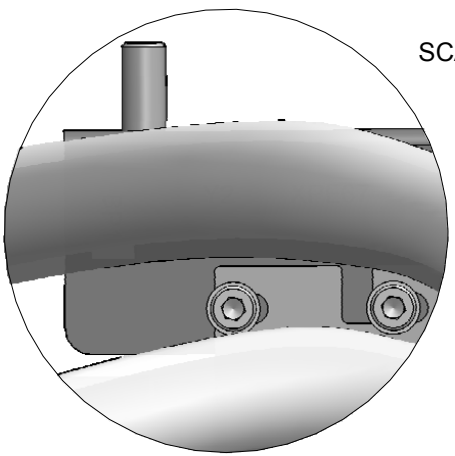
Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone: +45 44 600 800
Fax: +45 44 600 804

Material:
Scale: 1:10
Format: A2
Tolerance: DS/ISO 2768- mK
Weight : 7580.3 g

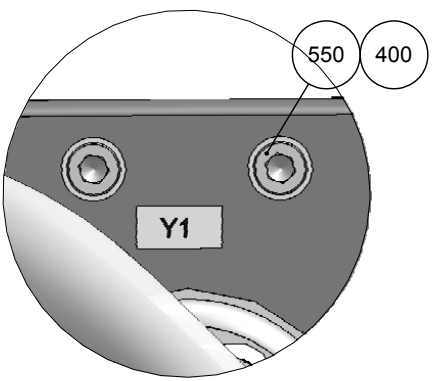
ID:
Description: **16140095 Plate for Valves, Assembled**
Page 1/2
Rev: I



SCALE 2 : 5



DETAIL H
SCALE 1 : 1



DETAIL I
SCALE 1 : 1

I	2015-09-02	pos.300 replaced		ABG	2015-03-09	SCA
A	2012-05-01			TDR	2013-03-07	ABG
Rev	Crea. date yyyy-mm-dd	Revision description		Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

Material:

Scale: **1:10**

Format: **A4**

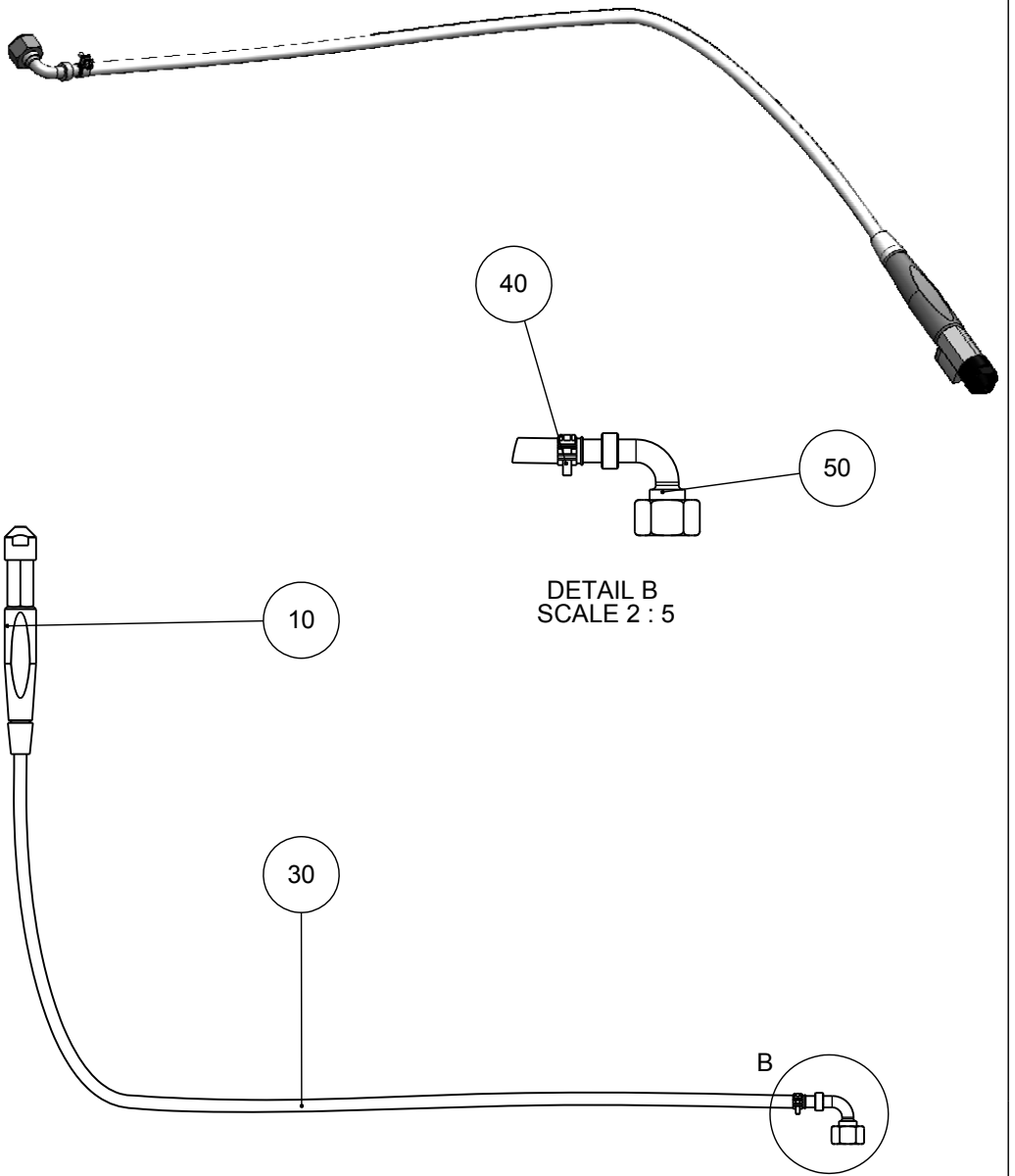
Tolerance: DS/ISO 2768 - mK

Weight : 7580.3 g

ID: Description:

16140095 Plate for Valves, Assembled

Rev: **I**



D	2014-05-06	quick coupling replaced by elbow	JAS	2014-05-06	SCA
A	2012-11-30		LDU	2012-11-30	TDR
Rev	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers

Pederstrupvej 84
DK-2750 Ballerup
Copenhagen
Denmark
Phone :+45 44600 800
Fax : +45 44600 804

Material:

Scale: **1:5**

Format: **A4**

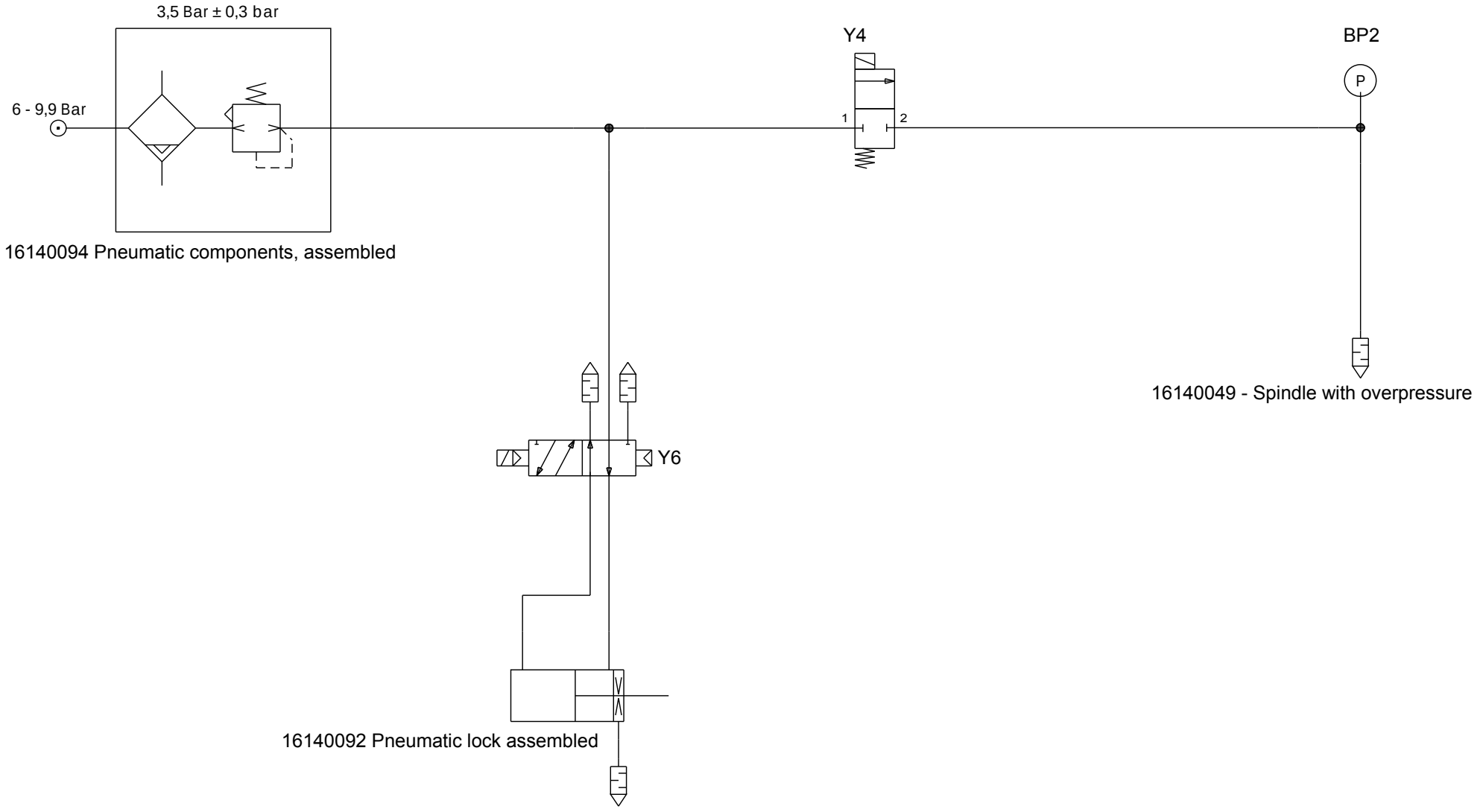
Tolerance: DS/ISO 2768 - mK

Weight : 237.0 g

ID: Description:

16140097 Water pistol

Rev: **D**



B	2016-02-02		JPO	2016-02-02	SCA
A	2015-08-04		JPO	2015-08-04	SCA
Revision	Crea. date yyyy-mm-dd	Revision description	Draw. Init	Appr. date yyyy-mm-dd	Appr. Init

Struers
Pederstrupvej 84
DK-2750 Ballerup/Copenhagen
Denmark
Phone:+45 44 600 800
Fax: +45 44 600 804

Material:

Scale: 1:1

Format: A3

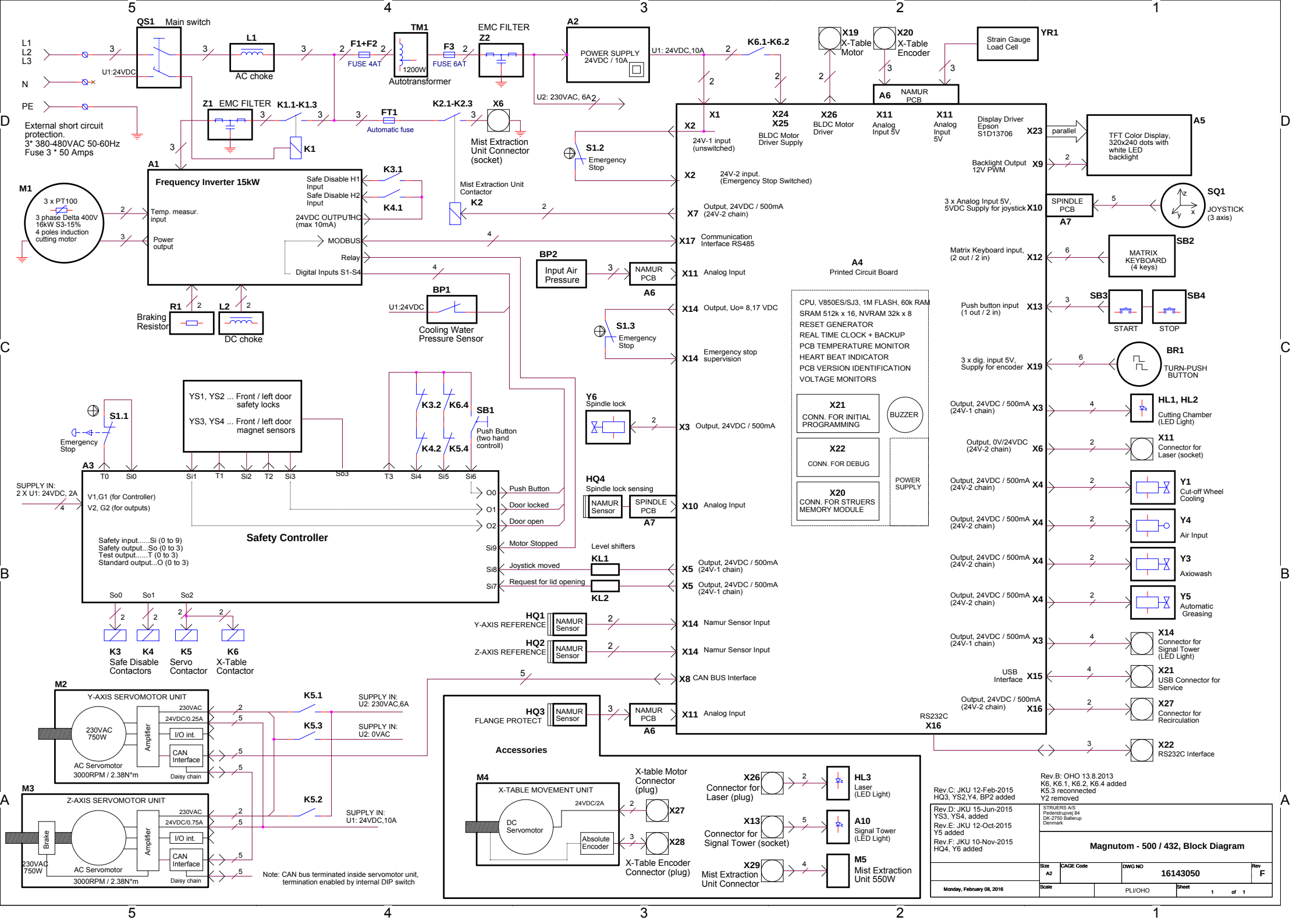
Tolerance: DS/ISO 2768-

Weight : g

ID: Description:

16141001 AIR DIAGRAM Magnutom 500

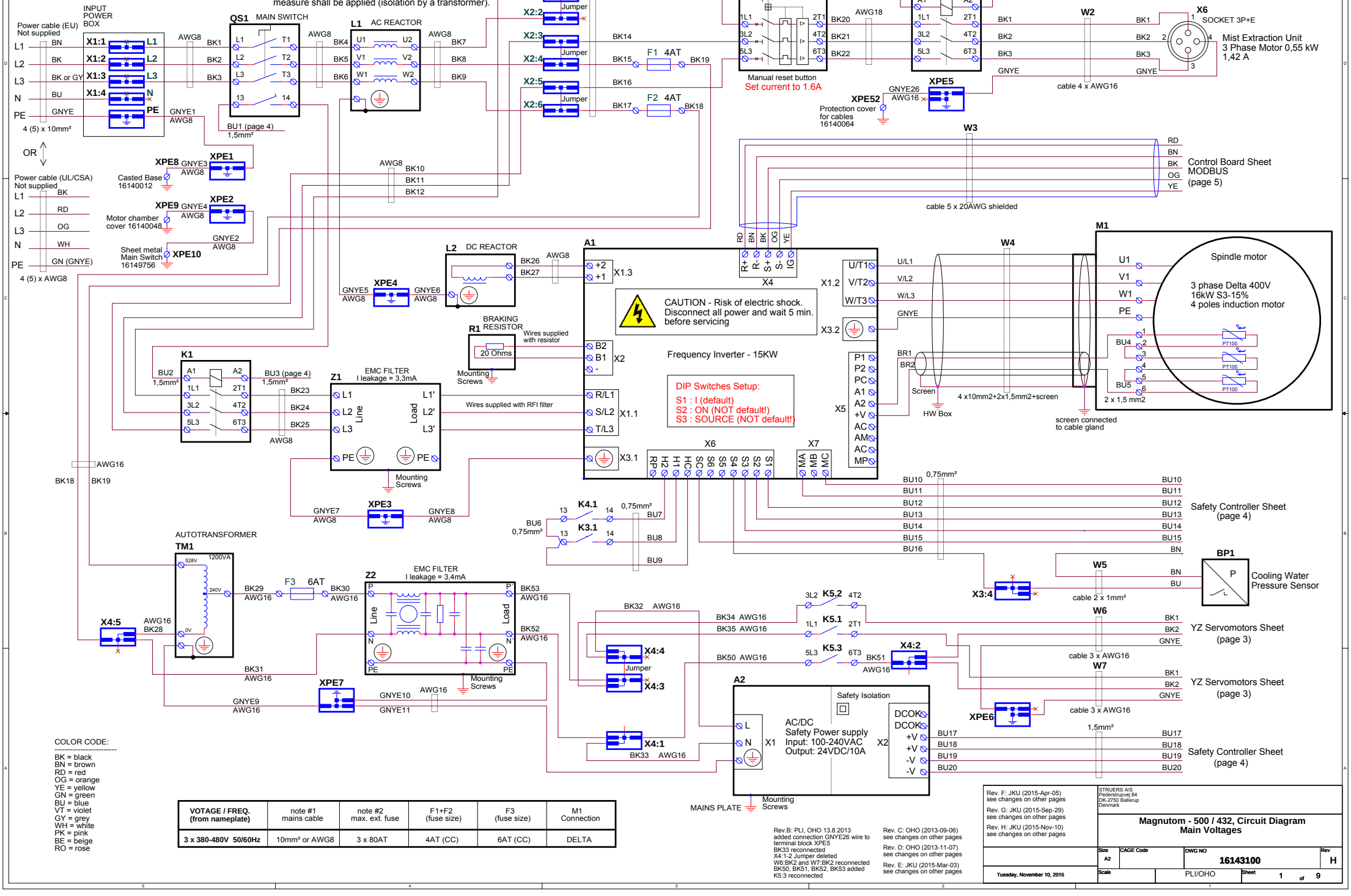
Rev: **B**


QS1 Main switch
L1
L2
L3
N
PE
U1:24VDC
External short circuit protection.
3* 380-480VAC 50-60Hz
Fuse 3 * 50 Amps
L1
AC choke
F1+F2
FUSE 4AT
TM1
1200W
Autotransformer
F3
FUSE 6AT
EMC FILTER
Z2
A2
POWER SUPPLY
24VDC / 10A
U1: 24VDC,10A
U2: 230VAC, 6A
K6.1-K6.2
X19
X-Table
Motor
X20
X-Table
Encoder
YR1
Strain Gauge
Load Cell
A6
NAMUR
PCB
Z1 EMC FILTER
K1.1-K1.3
FT1
Automatic fuse
K2.1-K2.3
X6
Mist Extraction
Unit Connector
(socket)
K1
A1
Frequency Inverter 15kW
Safe Disable H1
Input
Safe Disable H2
Input
24VDC OUTPUTHC
(max 10mA)
MODBUS
Relay
Digital Inputs S1-S4
K3.1
K4.1
M1
3 x PT100
3 phase Delta 400V
16kW S3-15%
4 poles induction
cutting motor
Temp. measur.
input
Power
output
Braking
Resistor
R1
L2
DC choke
BP1
U1:24VDC
Cooling Water
Pressure Sensor
Mist Extraction Unit
Contactor
K2
S1.2
Emergency
Stop
BP2
Input Air
Pressure
S1.3
Emergency
Stop
X2
24V-1 input
(unswitched)
X1
X24
X25
BLDC Motor
Driver Supply
X26
BLDC Motor
Driver
X11
Analog
Input 5V
X11
Analog
Input
5V
Display Driver
Epson
S1D13706
X23
parallel
A5
TFT Color Display,
320x240 dots with
white LED
backlight
Backlight Output
12V PWM
X9
X2
24V-2 input.
(Emergency Stop Switched)
X7
Output, 24VDC / 500mA
(24V-2 chain)
X17
Communication
Interface RS485
X11
Analog Input
X14
Output, Uo= 8,17 VDC
X14
Emergency stop
supervision
X3
Output, 24VDC / 500mA
X10
Analog Input
X5
Output, 24VDC / 500mA
(24V-1 chain)
X5
Output, 24VDC / 500mA
(24V-1 chain)
X14
Namur Sensor Input
X14
Namur Sensor Input
X8
CAN BUS Interface
X11
Analog Input
A4
Printed Circuit Board
CPU, V850ES/SJ3, 1M FLASH, 60k RAM
SRAM 512k x 16, NVRAM 32k x 8
RESET GENERATOR
REAL TIME CLOCK + BACKUP
PCB TEMPERATURE MONITOR
HEART BEAT INDICATOR
PCB VERSION IDENTIFICATION
VOLTAGE MONITORS
X21
CONN. FOR INITIAL
PROGRAMMING
BUZZER
X22
CONN. FOR DEBUG
X20
CONN. FOR STRUERS
MEMORY MODULE
POWER
SUPPLY
3 x Analog Input 5V,
5VDC Supply for joystick
X10
SPINDLE
PCB
A7
SQ1
JOYSTICK
(3 axis)
Matrix Keyboard input,
(2 out / 2 in)
X12
SB2
MATRIX
KEYBOARD
(4 keys)
Push button input
(1 out / 2 in)
X13
SB3
START
SB4
STOP
3 x dig. input 5V,
Supply for encoder
X19
BR1
TURN-PUSH
BUTTON
Output, 24VDC / 500mA
(24V-1 chain)
X3
HL1, HL2
Cutting Chamber
(LED Light)
Output, 0V/24VDC
(24V-2 chain)
X6
X11
Connector for
Laser (socket)
Output, 24VDC / 500mA
(24V-2 chain)
X4
Y1
Cut-off Wheel
Cooling
Output, 24VDC / 500mA
(24V-2 chain)
X4
Y4
Air Input
Output, 24VDC / 500mA
(24V-2 chain)
X4
Y3
Axiowash
Output, 24VDC / 500mA
(24V-2 chain)
X4
Y5
Automatic
Greasing
Output, 24VDC / 500mA
(24V-1 chain)
X3
X14
Connector for
Signal Tower
(LED Light)
USB
Interface
X15
X21
USB Connector for
Service
Output, 24VDC / 500mA
(24V-2 chain)
X16
X27
Connector for
Recirculation
RS232C
X16
X22
RS232C Interface
S1.1
Emergency
Stop
YS1, YS2 ... Front / left door
safety locks
YS3, YS4 ... Front / left door
magnet sensors
K3.2
K6.4
K4.2
K5.4
SB1
Push Button
(two hand
controll)
Y6
Spindle lock
A3
T0
Si0
Si1
T1
Si2
T2
Si3
So3
T3
Si4
Si5
Si6
SUPPLY IN:
2 X U1: 24VDC, 2A
V1,G1 (for Controller)
V2, G2 (for outputs)
Safety Controller
Safety input.....Si (0 to 9)
Safety output...So (0 to 3)
Test output.....T (0 to 3)
Standard output...O (0 to 3)
O0
O1
O2
Si9
Si8
Si7
Push Button
Door locked
Door open
Motor Stopped
Joystick moved
Request for lid opening
HQ4
Spindle lock sensing
NAMUR
Sensor
SPINDLE
PCB
A7
Level shifters
KL1
KL2
So0
So1
So2
K3
Safe Disable
Contactors
K4
Servo
Contactor
K5
X-Table
Contactor
K6
HQ1
Y-AXIS REFERENCE
HQ2
Z-AXIS REFERENCE
HQ3
FLANGE PROTECT
M2
Y-AXIS SERVOMOTOR UNIT
230VAC
750W
AC Servomotor
3000RPM / 2.38N*m
Amplifier
230VAC
24VDC/0.25A
I/O int.
CAN
Interface
Daisy chain
K5.1
K5.3
SUPPLY IN:
U2: 230VAC,6A
SUPPLY IN:
U2: 0VAC
M3
Z-AXIS SERVOMOTOR UNIT
Brake
230VAC
750W
AC Servomotor
3000RPM / 2.38N*m
Amplifier
230VAC
24VDC/0.75A
I/O int.
CAN
Interface
Daisy chain
K5.2
SUPPLY IN:
U1: 24VDC,10A
Note: CAN bus terminated inside servomotor unit,
termination enabled by internal DIP switch
Accessories
M4
X-TABLE MOVEMENT UNIT
DC
Servomotor
24VDC/2A
Absolute
Encoder
X27
X28
X-table Motor
Connector
(plug)
X-Table Encoder
Connector (plug)
X26
Connector for
Laser (plug)
HL3
Laser
(LED Light)
X13
Connector for
Signal Tower (socket)
A10
Signal Tower
(LED Light)
X29
Mist Extraction
Unit Connector
M5
Mist Extraction
Unit 550W
Rev.C: JKU 12-Feb-2015
HQ3, YS2,Y4, BP2 added
Rev.B: OHO 13.8.2013
K6, K6.1, K6.2, K6.4 added
K5.3 reconnected
Y2 removed
Rev.D: JKU 15-Jun-2015
YS3, YS4, added
Rev.E: JKU 12-Oct-2015
Y5 added
Rev.F: JKU 10-Nov-2015
HQ4, Y6 added
STRUERS A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark
Magnutom - 500 / 432, Block Diagram
Size
A2
CAGE Code
DWG NO
16143050
Rev
F
Monday, February 08, 2016
Scale
PLI/OHO
Sheet
1 of 1

SEE REQUIREMENTS FOR MAINS CABLE (EU or UL/CSA) - note #1

MUST BE EXTERNALLY FUSED
Fmax: See note #2

IMPORTANT!!!
For Magnutom connected to electrical installations with residual current circuit breakers, a residual current circuit breaker type B OR type B time delayed, 30 mA is REQUIRED. Alternatively, another protective measure shall be applied (isolation by a transformer).



COLOR CODE:

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

VOTAGE / FREQ. (from nameplate)	note #1 mains cable	note #2 max. ext. fuse	F1+F2 (fuse size)	F3 (fuse size)	M1 Connection
3 x 380-480V 50/60Hz	10mm² or AWG8	3 x 80AT	4AT (CC)	6AT (CC)	DELTA

Rev.B: PLI, OHO 13.8.2013
added connection GNYE26 wire to terminal block XPE5
BK33 reconnected
X4:1-2 Jumper deleted
W6:BK2 and W7:BK2 reconnected
BK50, BK51, BK52, BK53 added
K5:3 reconnected

Rev. C: OHO (2013-09-06) see changes on other pages
Rev. D: OHO (2013-11-07) see changes on other pages
Rev. E: JKU (2015-Mar-03) see changes on other pages

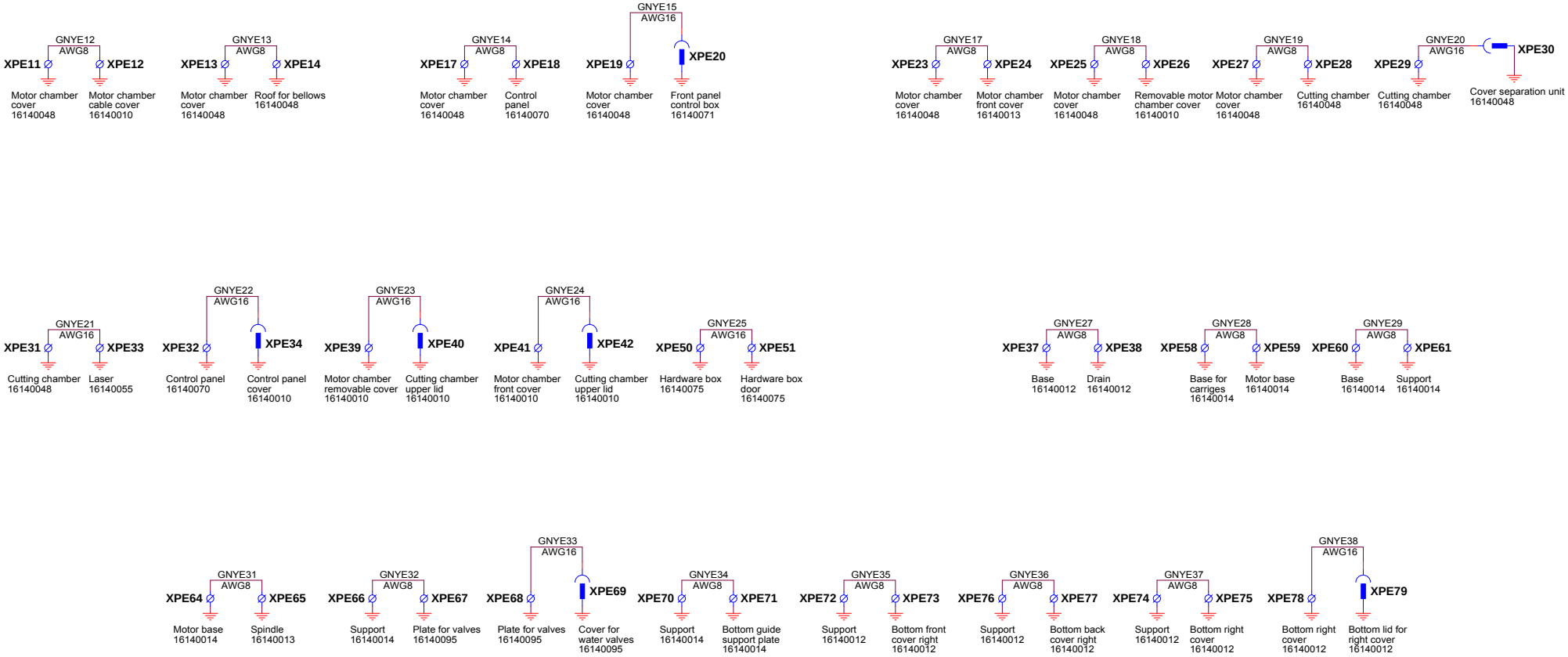
Rev. F: JKU (2015-Apr-05) see changes on other pages
Rev. G: JKU (2015-Sep-29) see changes on other pages
Rev. H: JKU (2015-Nov-10) see changes on other pages

STRUERS A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark

Magnutom - 500 / 432, Circuit Diagram Main Voltages

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Tuesday, November 10, 2015 | Scale | PLI/OHO | Sheet 1 of 9



Rev.B: PLI, OHO 13.8.2013
GNYE 15, 21, 22, 23, 24, 25, 33, 38 changed to AWG16
XPE 20, 34, 40, 42, 69, 79 changed to FASTON
XPE83 changed back to cable eye
XPE88 changed to XPE56
XPE89 changed to XPE55
updated assemblies item numbers

Rev. C: OHO (2013-09-06)
XPE62, XPE63, GNYE30 removed
XPE15 removed

Rev. D: OHO (2013-11-07)
GNYE16, XPE21, XPE22 removed

Rev. E: JKU (2015-Mar-03)
see changes on other pages

Rev. F: JKU (2015-Apr-05)
see changes on other pages

Rev. G: JKU (2015-Sep-29)
see changes on other pages

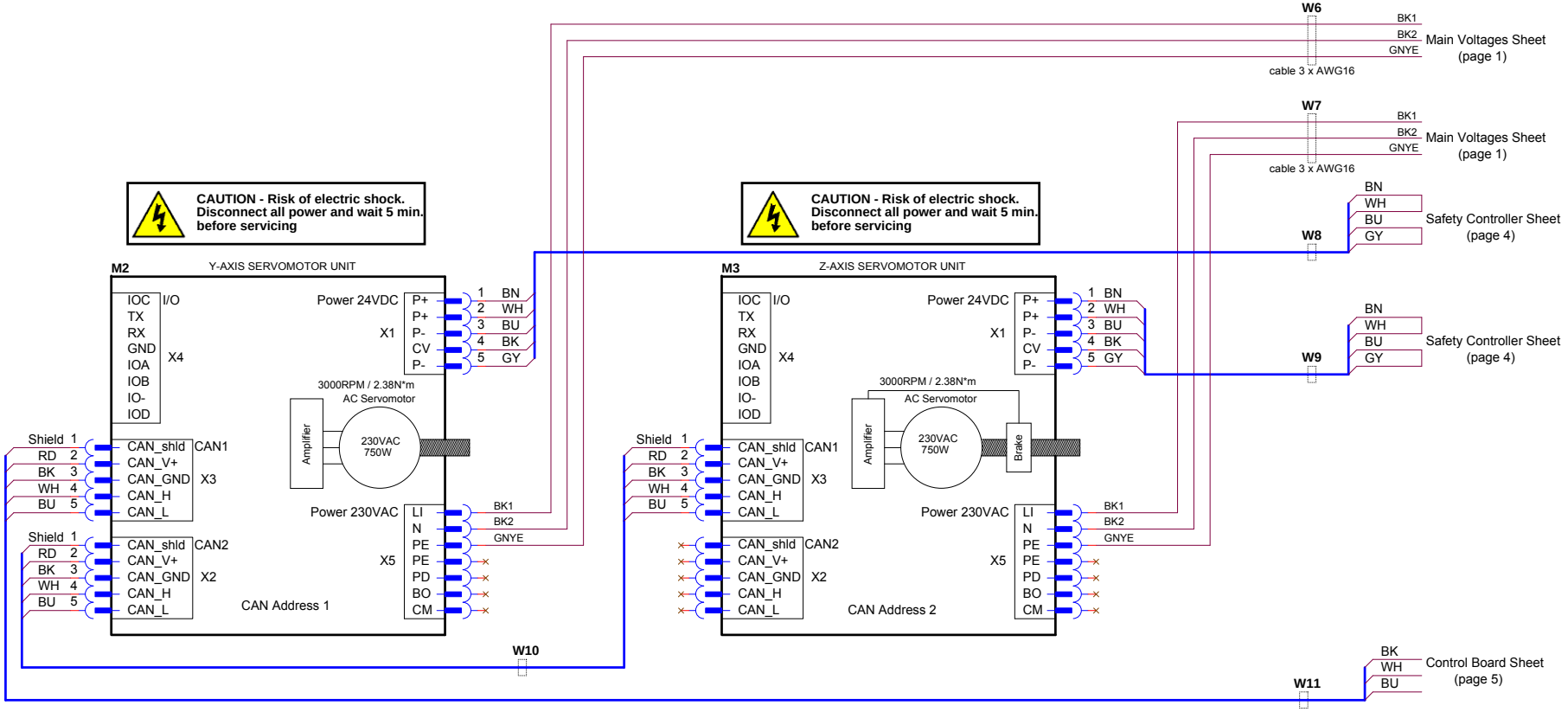
Rev. H: JKU (2015-Nov-10)
see changes on other pages

STRUERS A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark

Magnutom - 500 / 432, Circuit Diagram Grounding

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Scale		Sheet
Tuesday, November 10, 2015	PLI/OHO	2 of 9



Rev. D: OHO (2013-11-07)
see changes on other pages

Rev. E: JKU (2015-Mar-03)
see changes on other pages

Rev. F: JKU (2015-Apr-05)
see changes on other pages

Rev. G: JKU (2015-Sep-29)
see changes on other pages

Rev. H: JKU (2015-Nov-10)
see changes on other pages

STRUERS A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark

Magnutom - 500 / 432, Circuit Diagram
YZ Servomotors

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

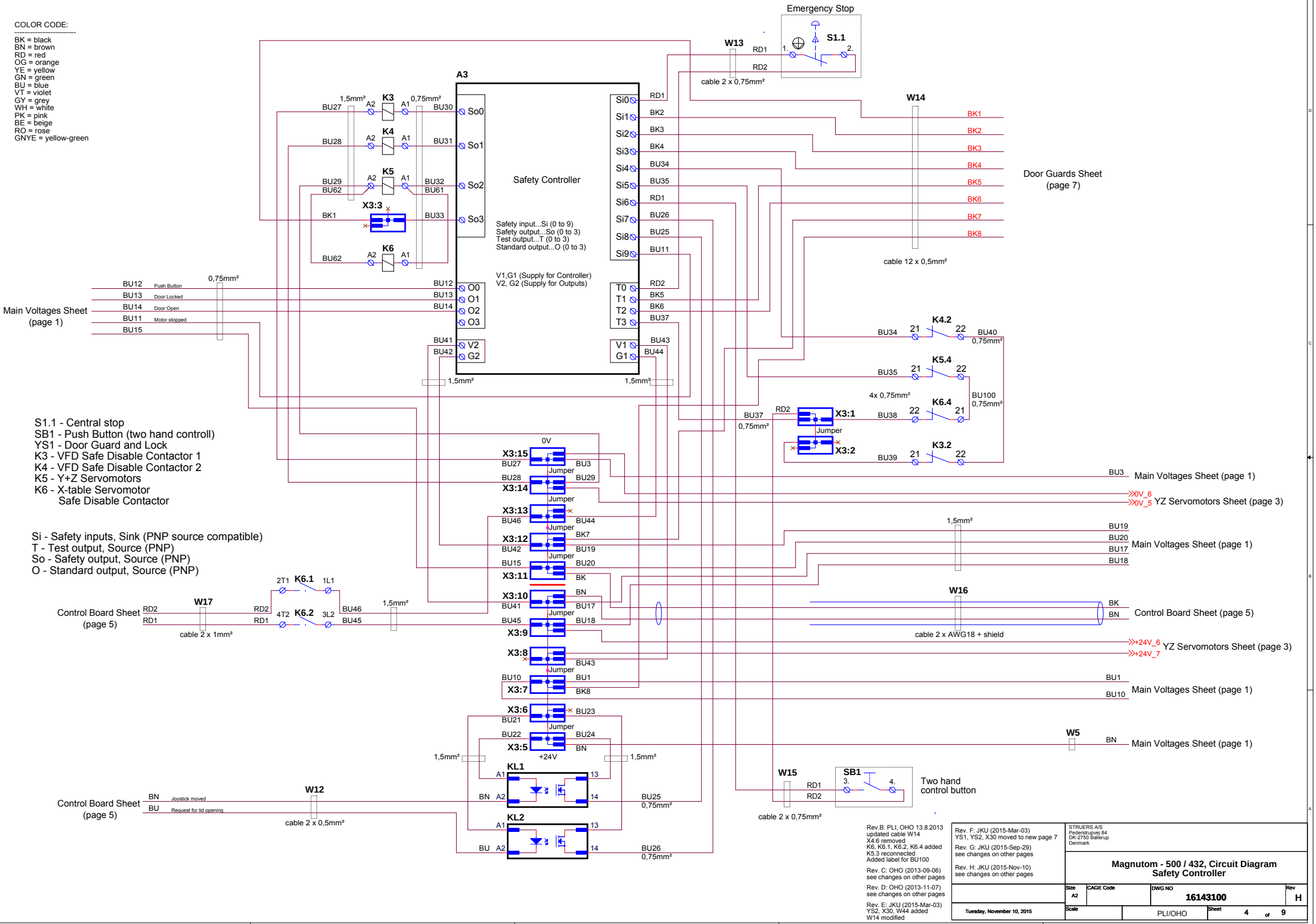
Tuesday, November 10, 2015

Scale: PLI/OHO

Sheet 3 of 9

COLOR CODE:

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-green



Rev.B: PLI, OHO 13.8.2013
updated cable W14
X4:6 removed
K6, K6.1, K6.2, K6.4 added
K5.3 reconnected
Added label for BU100

Rev. C: OHO (2013-09-06)
see changes on other pages

Rev. D: OHO (2013-11-07)
see changes on other pages

Rev. E: JKU (2015-Mar-03)
YS2, X30, W44 added
W14 modified

Rev. F: JKU (2015-Mar-03)
YS1, YS2, X30 moved to new page 7

Rev. G: JKU (2015-Sep-29)
see changes on other pages

Rev. H: JKU (2015-Nov-10)
see changes on other pages

STRUERS A/S
Pederstrupvej 84
DK-2750 Ballerup
Denmark

Magnutom - 500 / 432, Circuit Diagram
Safety Controller

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Tuesday, November 10, 2015

Scale: PLI/OHO

Sheet 4 of 9

COLOR CODE:

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-green

Safety Controller Sheet (page 4) BN BK — W16 cable 2 x AWG18 + shield

Safety Controller Sheet (page 4) RD1 RD2 — W17 cable 2 x 1mm²

S1.2 Emergency Stop — cable 2 x 0,75mm² — W18 BU47 1,5mm² — W26 cable 2 x 0,75mm² — Emergency Stop S1.3

Working light 1 HL1 — Working light 2 HL2 — Cables supplied with lights — X7 X8 X9 X10 — W21 cable 4 x 0,5mm²

A4 — X3-1 +24V-1 — X3-9 Sink Driver — X3-2 +24V-1 — X3-10 Sink Driver

Accessories Sheet (Signal Tower) — X14 COMMON GREEN YELLOW RED BUZZER — W24 cable 5 x 0,25mm² — X3-5 +24V-1 — X3-13 Sink Driver — X3-14 Sink Driver — X3-15 Sink Driver — X3-16 Sink Driver

Y6 Spindle lock valve — W46 cable 2 x 0,75mm² — X3-4 +24V-1 — X3-12 Sink Driver

HQ1 NAMUR Sensor Y-AXIS REFERENCE — X15 X16 — W25 cable 2 x 0,75mm² — X14-6 Namur Input — X14-5 GND

HQ2 NAMUR Sensor Z-AXIS REFERENCE — X17 X18 — W41 cable 2 x 0,75mm² — X14-2 Namur Input — X14-1 GND

X11 Connector for LASER — W22 cable 2 x 0,5mm² — X6-1 24V/0V — X6-2 24V/0V

BU52 BU53 BU54 0,5mm² — X18-5 +5V — X18-4 H1 — X18-3 H2 — X18-2 H3 — X18-1 GND

X-table connection box — See page 8 for details

W32 cable 5 x 0,75mm² — X4-3 +24V-2 — X4-7 Sink Driver — X4-9 Sink Driver — X4-11 Sink Driver — X4-8 Sink Driver

W33 cable 2 x 0,75mm² — X26-3 Phase A — X26-4 Phase B

W34 cable 3 x AWG20 + Shield — to A7:CON2-8 — X11-6 +12VDC — X11-5 AN01 — X11-4 GND

A6 Namur PCB (See 16143235)

YR1 Strain Gauge Load Cell — + supply — output — in gnd — out gnd — shield — Cable supplied with sensor — X21 X22 — W39 cable 4 x 0,5mm² + Shield — X11-3 +12VDC — X11-2 AN00 — X11-1 GND

BP2 Air pressure sensor — Cable supplied with sensor — X33 — W43 cable 6 x 0,5mm² — X11-11 AN03 — X11-10 GND — X11-8 AN02 — X11-7 GND

To HQ3 accessory See page 6

Printed Circuit Board

X22 CONN. FOR DEBUG

X20 CONN. FOR STRUERS MEMORY MODULE

X21 CONN. FOR INITIAL PROGRAMMING

BUZZER

24V-1: Unprotected voltage from 24VDC power supply
24V-2: Protected by Emergency Stop
24V-3: Protected by Emergency Stop Also

A5 — 40 wire flat cable; 0.5mm pitch — TFT Color Display, 320x240 dots with white LED backlight — Backlite extender — +12VDC X9-1 — 0V (PWM) X9-2

SQ1 Joystick (3 axis) — X12 — W20 cable 5 x 0,25mm²

A7 Spindle lock PCB (See 16143236 for details) — +5V X10-10 — Namur X10-6 — Xa X10-4 — Ya X10-3 — Za X10-2 — 0V X10-1

SB2 Matrix Keyboard — TYPE INFO — Mag.-500 — Mag.-432 — F1 — COOLING — AXIOWASH — ESCAPE — SL1 X12-2 — SL2 X12-3 — RL0 X12-7 — RL1 X12-8 — RL2 X12-9 — RL3 X12-10

SB3 START — SB4 STOP — SL0 X13-1 — RL0 X13-2 — RL1 X13-3 — BU48 — BU49 — BU50 — 3 x 0,5mm² — BU51 0,5mm² — 0,5mm² to A6:CON2-3

Position Sensor — HQ4 Spindle Lock — Cable supplied with sensor

BR1 Turn - Push Button — W35 6 wire flat cable — 0V X19-1 — 0V X19-2 — Switch X19-3 — CH-A X19-4 — CHB X19-5 — +5V X19-6 — Connection to X33 (Page5)

X152 USB (For test and service) — USB-B — 0V X15-3 — VBUS X15-1 — D- X15-5 — D+ X15-2 — GND-S X15-4 — W36 cable 4 x AWG24 + Shield

X32 RS232 — 9p male — GND X16-7 — TX X16-3 — RX X16-4 — W37 cable 4 x 0,5mm² (cut BE wire)

Recirculation Unit (Cooli) — X25 — W42 — X23 X24 — W38 — switched 24V-2 X16-1 — 0V X16-5 — cable 2 x 0,5mm²

YZ Servomotors Sheet (page 3) — servomotor Y-axis cable W11 — CAN-HIGH X8-2 — CAN-LOW X8-3 — 0V X8-4 — GND-S X8-8

Safety Controller Sheet (page 4) — W12 cable 2 x 0,5mm² — Joystick Moved — Request for lid opening — Sink Driver X5-3 — X5-4

Main Voltages Sheet Mist Extraction Unit (page 1) — W1 cable 2 x 0,5mm² — 24V/0V X7-1 — 24V/0V X7-8

W3 cable 5 x 20AWG shielded — TX+ X17-2 — TX- X17-7 — RX+ X17-1 — RX- X17-6 — GND X17-3 — GND-S X17-10

FRONT PANEL — Main Voltages Sheet MODBUS (page 1)

*1
Valve Y2 (Flushing) removed
Cable W28 removed
Terminal block X5:4 removed
Terminal blocks X5:5-X5:10 renamed to X5:4-X5:9
Changed connection of BN wire of W29
X19,X20-changed type of connector
Cable W32 - type changed
BU52-54 changed to 0.5mm2
BU57-59 changed to 0.5mm2
W11-connection to shielding added
W24-color of wires altered (copy of Hexamatic order)
W25 split to W25 & W41
W37 split to W37 & W42
X13, W23 moved to Accessories page
W27, W29 changed to 2x1mm2
W37 updated to 4x0,5mm2
W38, W42 updated to 2x0,5mm2
W20 connection updated
W25, W41 updated to 2x0,75mm2
W39 updated to 4x0,5mm2

*2
Namur PCB (A6) added
X21 changed to X152
X22 changed to X32
X23 changed to X21
X24 changed to X22
X25 changed to X23
X26 changed to X24
X27 changed to X25
X33, W43 added
X5, W32 modified
BP2, Y4, VD3 added

Rev.B: PLI, OHO 13.8.2013 - see text *1
Rev. C: OHO (2013-09-06) VD2 added
Rev. D: OHO (2013-11-07) see changes on other pages
Rev. E: JKU (2015-Mar-03) - see text *2
Rev. F: JKU (2015-Apr-05) see changes on other pages
Rev. G: JKU (2015-Sep-29) X-Table box moved to page 8 W32 changed
Rev. H: JKU (2015-Nov-10) A7, Y6, W46, HQ4, BN (A6toA7) added

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Magnutom - 500 / 432, Circuit Diagram Control Board

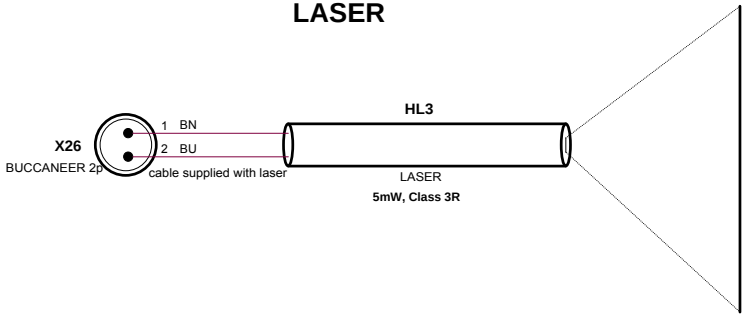
Size	CAGE Code	DWG NO	Rev
A2		16143100	H
Scale		Sheet	
	PLI/OHO	5 of 9	

Monday, February 08, 2016

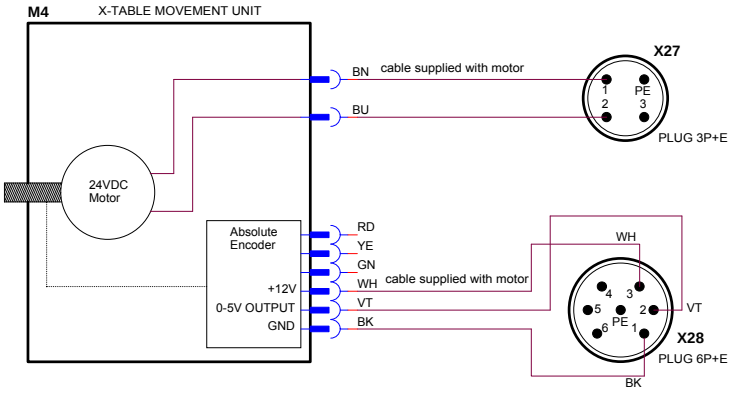
COLOR CODE:

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-green

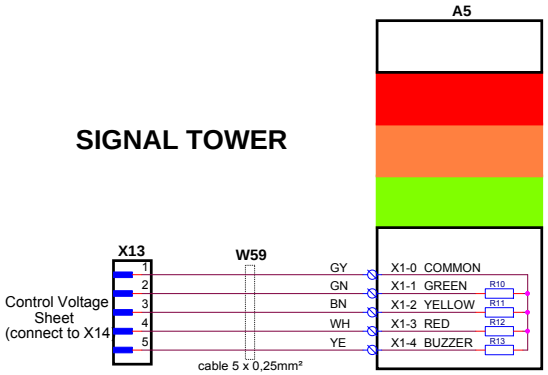
LASER



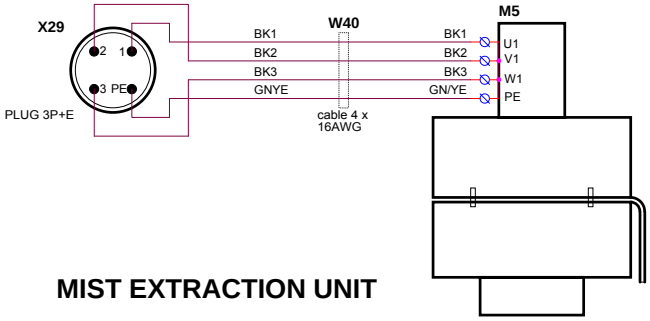
X-TABLE



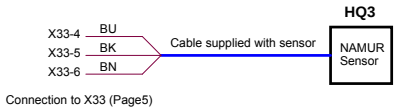
SIGNAL TOWER



MIST EXTRACTION UNIT



FLANGE PROTECTION (optional)



Rev.B: PLI, OHO 13.8.2013
Cable number W24 corrected to W23
Connecter X27,X28 changed
W23-color of wires altered
(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: JKU (2015-Mar-03)
HQ3 added

Rev. F: JKU (2015-Apr-05)
see changes on other pages

Rev. G: JKU (2015-Sep-29)
see changes on other pages

Rev. H: JKU (2015-Nov-10)
see changes on other pages

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Magnutom - 500 / 432, Circuit Diagram Accessories

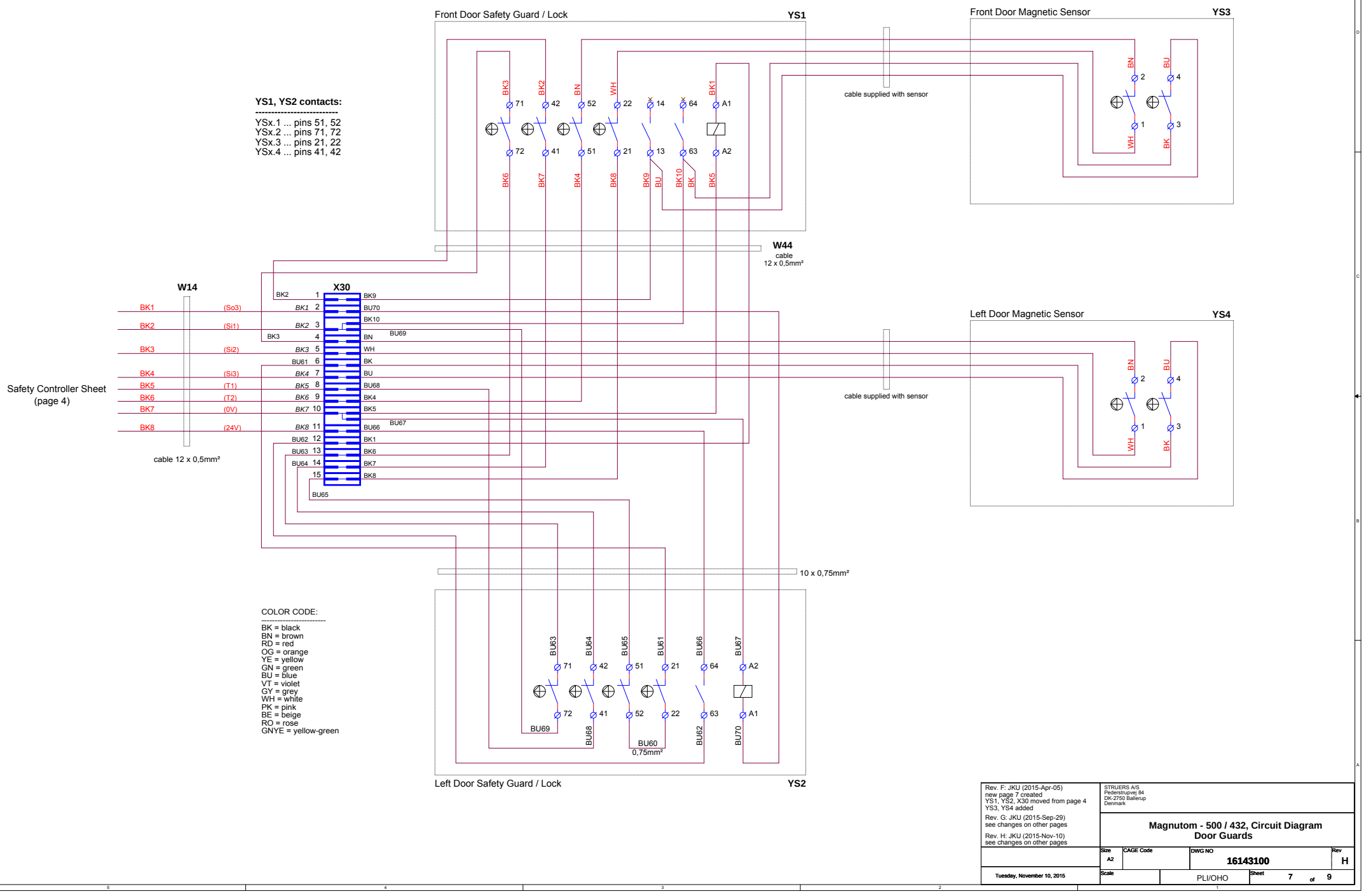
Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Thursday, February 04, 2016

Scale

PLI/OHO

Sheet 6 of 9



Rev. F: JKU (2015-Apr-05)
new page 7 created
YS1, YS2, X30 moved from page 4
YS3, YS4 added

Rev. G: JKU (2015-Sep-29)
see changes on other pages

Rev. H: JKU (2015-Nov-10)
see changes on other pages

Tuesday, November 10, 2015

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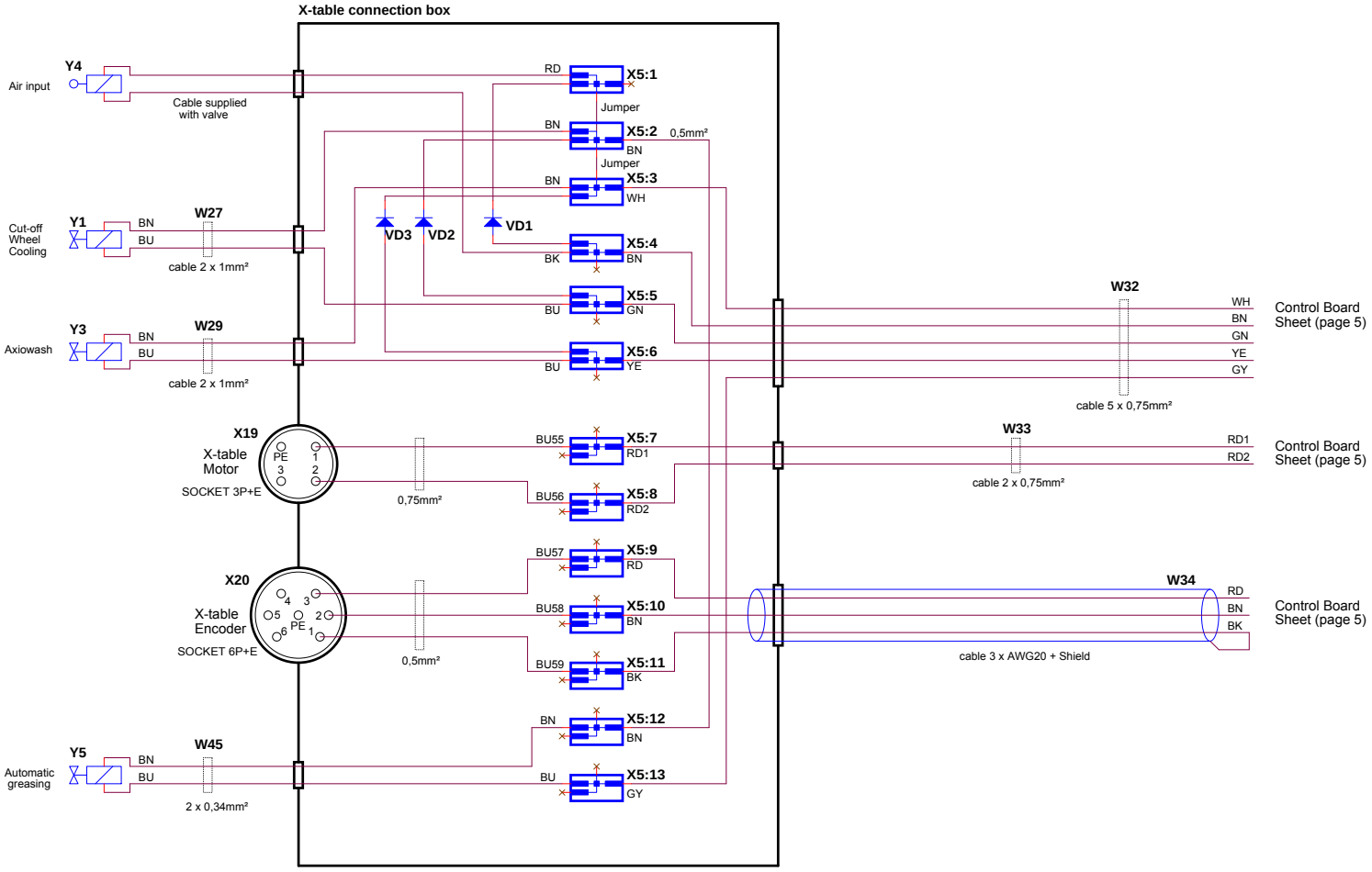
Magnutom - 500 / 432, Circuit Diagram Door Guards

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Scale		Sheet	
	PLI/OHO	7 of 9	



Rev. G: JKU (2015-Sep-29)
new page 8 created
X-table box moved from page 5
Y5, W45 added, X5 changed

Rev. H: JKU (2015-Nov-10)
see changes on other pages

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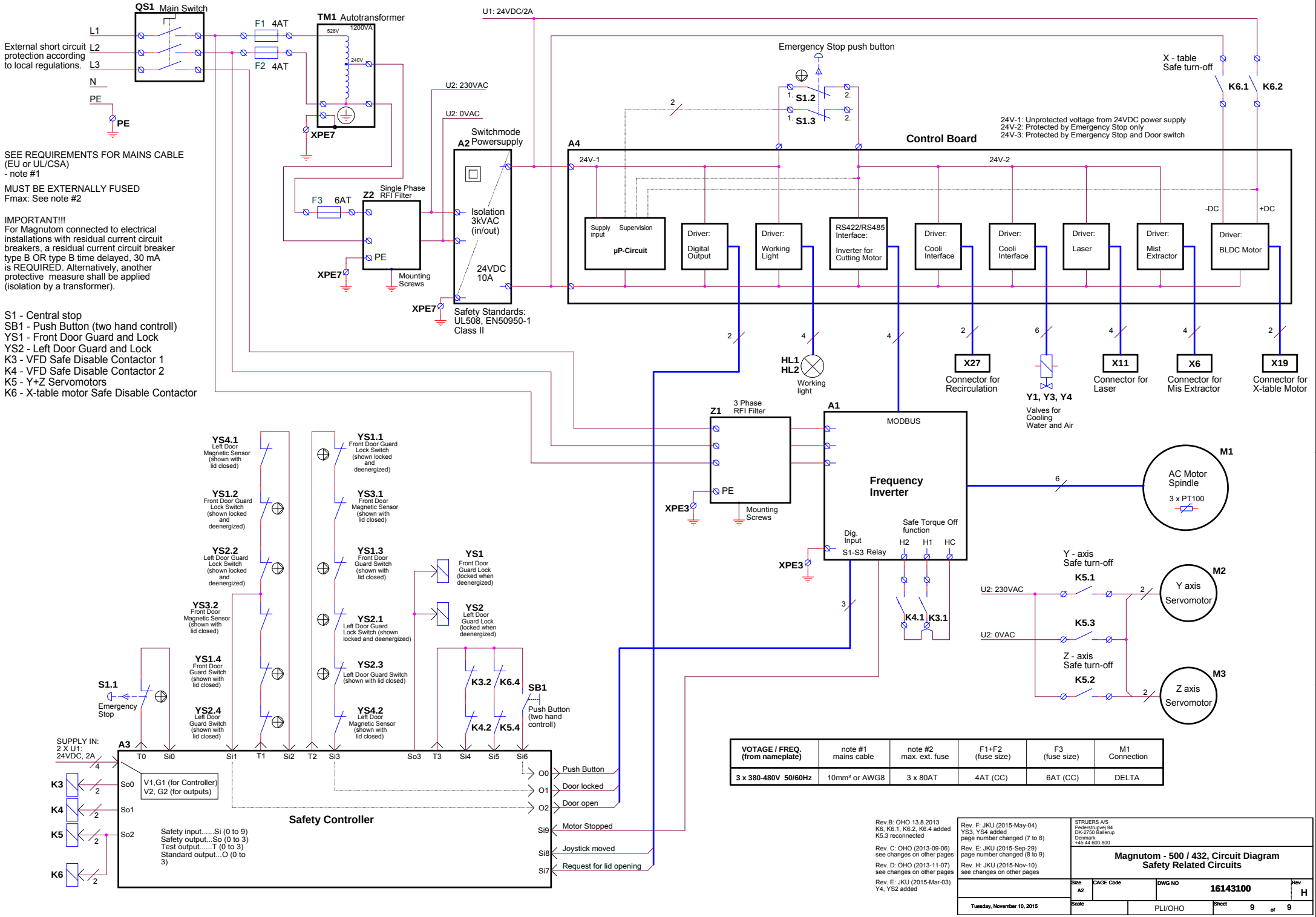
Magnutom - 500 / 432, Circuit Diagram
X - Table box

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

Tuesday, November 10, 2015

Scale: PLI/OHO

Sheet 8 of 9



VOTAGE / FREQ. (from nameplate)	note #1 mains cable	note #2 max. ext. fuse	F1+F2 (fuse size)	F3 (fuse size)	M1 Connection
3 x 380-480V 50/60Hz	10mm² or AWG8	3 x 80AT	4AT (CC)	6AT (CC)	DELTA

Rev.B: OHO 13.8.2013
K6, K6.1, K6.2, K6.4 added
K5.3 reconnected

Rev. C: OHO (2013-09-06)
see changes on other pages

Rev. D: OHO (2013-11-07)
see changes on other pages

Rev. E: JKU (2015-Mar-03)
Y4, YS2 added

Rev. F: JKU (2015-May-04)
YS3, YS4 added
page number changed (7 to 8)

Rev. E: JKU (2015-Sep-29)
page number changed (8 to 9)

Rev. H: JKU (2015-Nov-10)
see changes on other pages

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Magnutom - 500 / 432, Circuit Diagram Safety Related Circuits

Size	CAGE Code	DWG NO	Rev
A2		16143100	H

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Scale

PLI/OHO

Sheet 9 of 9

Overview, Variant Parts in Magnutom:

Rev. B: LDU 2013-11-14

Country Nom. voltage / freq.	Guard for Cut–off wheel (wheel diameter)	Table	Machine Item No.:
3x380-480V 50-60Hz	432 mm	Fixed	06276146
		Automatic	06276246
	508 mm	Fixed	06146146
		Automatic	06146246

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