Operators manual

1.0 English I December 2024

BORDO®
INDUSTRIAL TOOLS

Magnetic drilling machine

MAG100

Congratulations on your purchase of the SMART.100 portable magnetic drilling machine. Your model is designed to produce superior holes quickly and efficiently.

Before operating your new magnetic drilling machine, please read all instructions in the Operators Manual first. With proper use, care and maintenance this machine will provide you with many years of effective hole drilling performance.

TO REDUCE THE RISK OF INJURY USER MUST READ AND UNDERSTAND ALL INSTRUCTIONS

The original manual has been produced in the English language. If any discrepancies should occur in translations, reference must be made to the original version for clarification.

BORDO®
INDUSTRIAL TOOLS

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1. Safety

1.1 General safety instructions

Do not use this magnetic drilling machine before you have thoroughly read and completely understood this manual, specifically the “General safety instructions” and ‘’Specific safety information’’, including the figures, specifications, safety regulations and the signs indicating DANGER, WARNING and CAUTION.

⚠ ***WARNING:*** *When using electrical tools basic safety precautions should always be followed to reduce the risk of fire, electrical shock and personal injury.*

Please also observe the relevant national industrial safety regulations. Non-observance of the safety instructions can lead to an electric shock, burns and/or severe injuries.

This manual should be kept for later use and enclosed with the magnetic drilling machine, should it be passed on or sold.

Work area

1. Keep your work area clean and well lit. Cluttered and dark work areas increase the change of accidents;
2. Do not operate a magnetic drilling machine in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. A magnetic drilling machine may create sparks which could ignite the dust or fumes;
3. Keep bystanders, children and visitors away while operating a magnetic drilling machine. Distractions can cause you to lose control.

Electrical safety

1. A magnetic drilling machine plug must match the outlet. Never modify the plug in any way. Do not use any adapter plugs;
2. Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increased risk of electric shock if your body is grounded;
3. Do not expose the magnetic drilling machine to rain or wet conditions. Water entering a machine will increase the risk of electric shock;
4. Do not abuse the cord. Never use the cord to carry the magnetic drilling machine or pull the plug from an outlet. Keep the cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock. Damaged cord must be replaced by manufacturer, its service agent or similarly qualified persons in order to avoid a hazard;
5. When operating a magnetic drilling machine, use an extension cord suitable for outdoor use, this reduces the risk of electric shock;
6. If operating a magnetic drilling machine in a damp location is unavoidable, use a residual current device (RCD), this reduces the risk of electric shock.
7. It is recommended that the **tool** always be supplied via a residual current device having a rated residual current of 30 mA or less.

Personal safety

1. Stay alert, watch what you are doing and use common sense when using a magnetic drilling machine. Do not use the machine while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating a magnetic drilling machine may result in serious personal injury;
2. Dress properly. Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts;
3. Avoid accidental starting. Be sure the switch is off before plugging the machine in. Carrying a magnetic drilling machine with your finger on the switch or plugging in a magnetic drilling machine that has the switch on increases the chance of accidents;
4. Never place hands, fingers, gloves or clothing near drilling area or rotating machine parts;
5. Remove adjusting keys or switches before turning the machine on. A wrench or a key that is left attached to a rotating part of the machine may result in personal injury;
6. Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the drilling machine in unexpected situations;
7. Use safety equipment. Always wear eye protection. Dust mask, non-skid safety shoes, hard hat and hearing protection must be used for optimal safety;
8. Always use supplied safety chain during any work on non-horizontal surfaces. Magnetic drilling machine can release from surface.

 ***WARNING:*** *Wear ear and eye protection when using this machine.*

Machine use and care

1. When using the machine on non-horizontal surfaces, you must use cutting paste. Do not use oil because the oil can drip into the motor unit;
2. While operating the machine, the annular cutter must be cooled and lubricated with high quality cutting lubricants;
3. Always remove the slug from the annular cutter after each hole.

 ***WARNING:*** *The slug is sharp and may be hot!*

4. Use clamps or other practical solutions to secure and support the workpiece to a stable platform. Holding the workpiece by hand or against your body is unstable and may lead to loss of control;
5. Do not use the machine when the switch does not turn it on or off. Any machine that cannot be controlled with the switch is dangerous and must be repaired;
6. Disconnect the plug from the power source before making any adjustments, changing accessories or storing the tool. Such preventive safety measures reduce the risk of starting the tool accidentally;
7. Store your magnetic drilling machine out of reach for children and other untrained persons. Tools are dangerous in the hands of untrained users;
8. Maintain your machine with care. Keep cutting tools sharp and clean. Properly maintained tools, with sharp cutting edges are less likely to break and are easier to control;
9. Check for misalignment of moving parts, breakage of parts and any other condition that may affect the machine's operation. If you detect damage have the machine serviced before use. Many accidents are caused by poorly maintained tools;
10. Only use accessories that are recommended for your machine model. Accessories that are suitable for one machine, may become hazardous when used on another machine.

Service

1. Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in risk of injury;
2. When servicing a tool, use only identical replacement parts. Follow instructions in the maintenance section of this manual. Use of unauthorised parts or failure to follow maintenance instructions may create a risk of electric shock or injury;

1.2 Specific safety information

- Keep your fingers away from the drilling area;
- Avoid touching the slug that is automatically ejected by the pilot pin when the working procedure is finished. Contact with the slug when it is hot, or if it falls, can cause personal injuries;
- Always use the safety guard. Before switching on the machine ensure that the guard is closed securely;
- Always use the safety chain;
- The magnetic drilling machine is suitable for use on steel with a thickness starting from 6 mm, with zero air gap between the magnet core surface and the mounting surface. Curvature, coats of paint and surface irregularities will create an air gap. Keep the air gap to a minimum;
- Always place the machine on a flat surface;
- Do not clamp the magnetic drilling machine on small or irregular shaped objects;
- Always place the machine on a surface that is clear of shavings, chips, swarf and surface dirt;
- Keep the magnet clean and free of debris and swarf;
- Do not switch on the machine before checking whether the magnetic stand has been tightened firmly to the mounting surface;
- Adjust the machine so cutter does not extend into the workpiece before drilling. Do not perform any design, assembly or construction activities on the workpiece while the machine is switched on;
- Before switching on the machine, make sure all accessories have been mounted correctly;
- Do not switch on the machine until it has been mounted and installed according to all above mentioned instructions;
- Always use the recommended speed for the accessories and material you are working with;
- Do not use the machine on the same workpiece on which electric welders are working;
- Only use an appropriate cutting lubricant. We offer a wide range of well-considered cooling and lubrication products to match your requirements;
- Do not use liquid cutting fluids while drilling vertically or overhead. Dip the cutter in cutting paste or apply an appropriate spray for these applications;
- Do not pour cutting fluid into the reservoir while it is mounted in the bracket. Do not allow cutting fluid to enter the drill motor;
- Before use, ensure movable safety guard operates properly;
- In case of a jammed cutter, turn of the machine, disconnect the machine from the power supply and then remove the reason for the jam before turning on the machine again.

Residual risk

In spite of following the relevant safety regulations and their implementation, certain residual risks cannot be avoided. These are:

- Impairment of hearing;
- Risk of personal injury from flying particles;
- Risk of burns due to accessories becoming hot during operation;
- Risk of personal injury due to prolonged use.

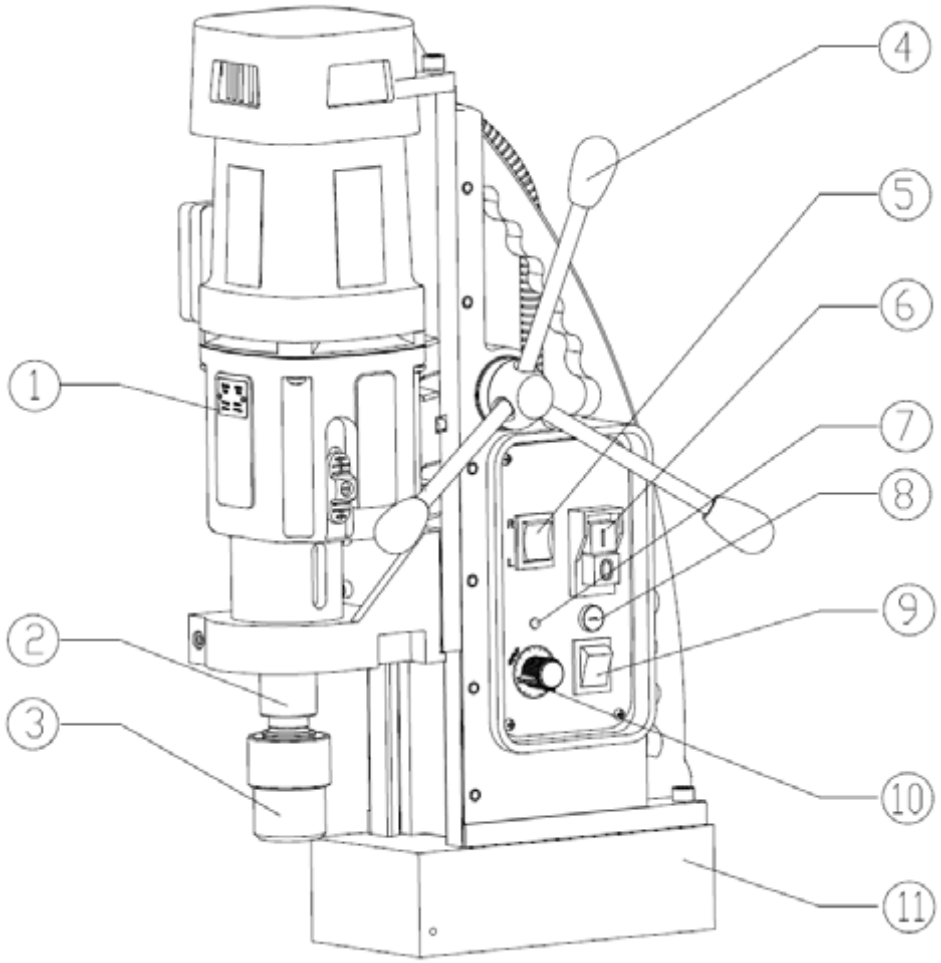
Always try to reduce these risks as much as possible.

2. Description

2.1 Intended use

This magnetic drilling machine is intended for commercial use as a machine for drilling holes in materials with a magnetisable surface, for tapping, for reaming and for countersinking in a weather-protected environment using the recommended application tools and accessories. The magnetic drilling machine can be used horizontally, vertically or overhead.

2.2 Features



[image 2-1]

1 Gearbox guide
2 Output shaft
3 Morse taper spindle
4 Feed handle
5 L/R switch
6 Motor switch
7 Magnet LED indicator
8 Fuse holder
9 Magnet switch
10 Speed control knob
11 Electromagnet

2.3 Case content

1 x MAG100 magnetic drilling machine
1 x safety guard
3 x handles
1 x hex key 2.5 mm
1 x hex key 4 mm
1 x hex key 5 mm
1 x hex key 6 mm
1 x stop pin
1 x lubrication system
1 x safety chain
1 x arbor MT 3 - 19.05 mm (3/4"), including lubrication ring
1 x Morse taper ejector drift key
1 x user manual

2.4 Serial number

The serial number is mentioned on the machine three times: engraved on the frame, engraved on the magnet and on the serial no. sticker on the motor housing. Additional serial no. stickers are provided with the machine for your administration.

The serial number will help you, your dealer and distributor validate and identify the machine.

For example:

100ST2205001

breaks down to:

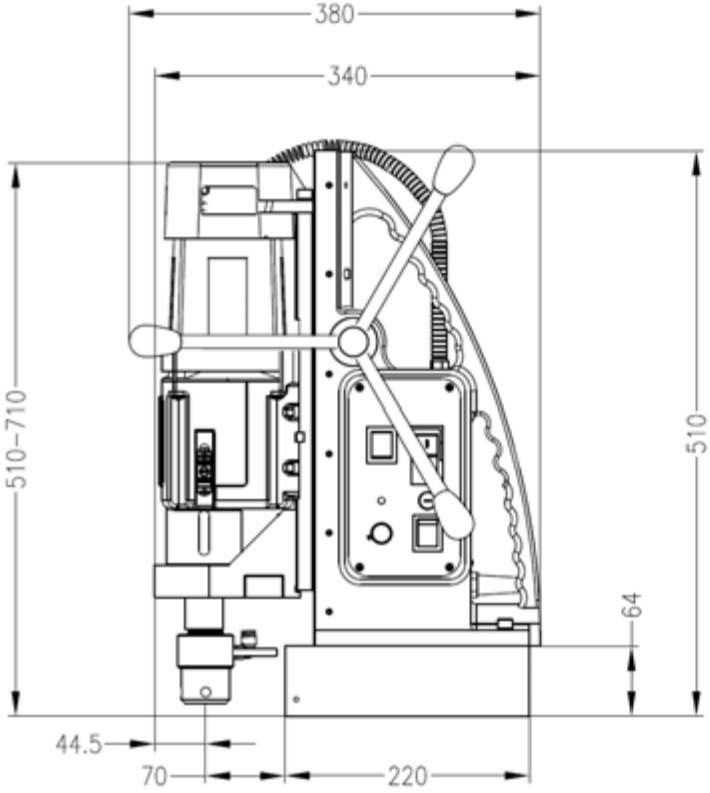
100ST 22 05 001

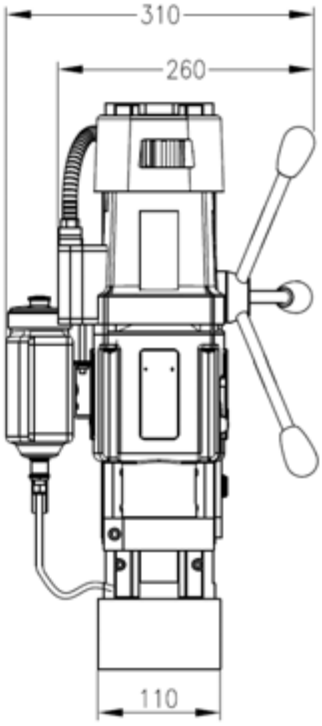
Machine series
Year of manufacture
Month of manufacture
Identification number

2.5 Technical data

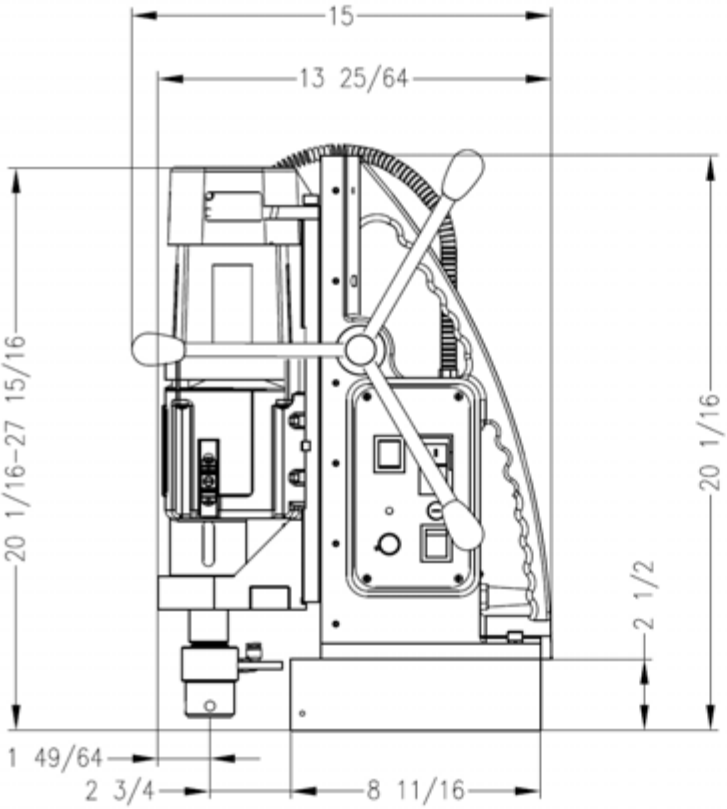
	Metric	Imperial
Annular cutting	Ø 12 - 100 mm	Ø 1/2" - 13 15/16"
Twist drilling	Ø 1 - 31.75 mm	Ø 1/16" - 1 1/4"
Tapping	M3 - M30	1/8" - 1 3/16"
Countersinking	Ø 10 - 105 mm	Ø 3/8" - 4 1/8"
Length	340 mm	13 25/64"
Width	310 mm	12 3/16"
Height	510 - 710 mm	20 1/16" - 27 15/16"
Stroke	260 mm	10 1/4"
Weight	28.0 kg	61.7 lbs
Magnet (l x w x h)	220 x 110 x 64 mm	8 11/16" x 4 5/16" x 2 1/2"
Magnetic force	2,500 kg	5,512 lbs
Motor power	1,800 W	16.4 A
Total power	1,950 W	17.7 A
Speed (no load)	(I) 40 - 110 rpm (II) 65 - 180 rpm (III) 140 - 380 rpm (IV) 220 - 610 rpm	
Speed (1,800 W load)	(I) 85 rpm (II) 152 rpm (III) 270 rpm (IV) 480 rpm	
Spindle (Weldon)	MT3 19.05 mm	MT3 3/4"
Voltage	220 - 240 V / 50 - 60 Hz	110 - 120 V / 60 Hz

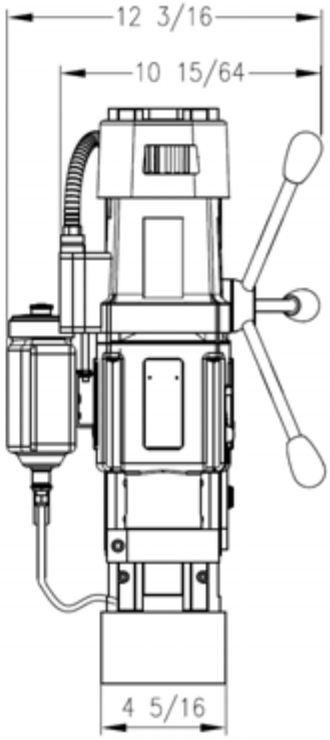
Dimensions (mm)





Dimensions (")





2.6 Symbols

Symbol	Term, meaning	Explanation
	Read documentation	Be sure to read the documentation in this user manual and specifically the “General safety instructions” and ‘’Specific safety information’’
	Wear ear protection	Use ear protection during operation
	Wear eye protection	Use eye protection during operation
	Danger/warning/caution	Read and apply the information in the adjacent text!
	European conformity symbol	Confirms the conformity of the magnetic drilling machine with the directives of the European Community
	Class of protection I	Product with basic insulation and exposed (touchable) conductive parts additionally connected to the protective earth conductor
mm	Millimeter	Unit of measure for the dimensions
"	Inch	Unit of measure for the dimensions
kg	Kilogram	Unit of measure for the mass
lbs	Pound	Unit of measure for the mass
V	Volt	Unit of measure for the electric voltage
A	Ampère	Unit of measure for the electric current intensity
W	Watt	Unit of measure for the output
rpm	Revolutions per minute	Unit of measure for the revolutions

2.7 Environmental

Separate collection. This product must not be disposed of with normal household waste.

Separate collection of used products and packaging allows materials to be recycled and used again. Re-use of recycled materials helps prevent environmental pollution and reduces the demand for raw materials.

Local regulations may provide for separate collection of electrical products from the household, at municipal waste sites or at the retailer when you purchase a new product.

3. Preparation & adjustment

3.1 Assembly

WARNING: *To reduce the risk of injury, turn machine off and disconnect from power source before installing and removing accessories, before adjusting or changing set-ups or when making repairs. Be sure all switches are in the OFF position. An accidental start-up can cause injury.*

Fitting the feed handles

1. Fit each of the 3 feed handles by screwing them into the hub in clockwise direction.
2. Tighten firmly by hand.

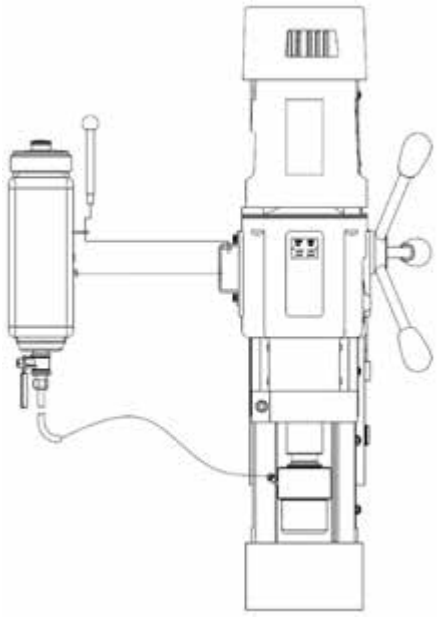
The handles are supposed to face slightly outward. Be careful not to cross-thread any of the components.

Mounting the safety guard

The safety guard protects against chippings and accidental contact and must always be mounted before operation:

1. Hold the guard in front of the magnet, align the slots in the guard with the holes in the magnet;
2. Fit the screws into the holes located in the side of the magnet.

WARNING: *Always use the safety guard.*



[image 3-1]

Fitting the lubrication system

The lubrication system can only be used for horizontal drilling (the drill being used vertically).

1. Hang the tank on the tank holder;
2. Position and tighten the attachment pin;
3. Connect the hose to the fitting on the gearbox. Make sure the hose is connected fully and tightly;
4. To disconnect the hose, press the blue ring on the connection and gently pull out the hose.

In order to use the lubrication system, it must be filled with a sufficient amount of cutting fluid.

1. Make sure the flow regulator is closed;
2. Unscrew the cap;
3. Fill the container with cutting fluid;
4. Screw the cap back on.

WARNING: *Do not use the lubrication system in vertical or overhead drilling applications. Instead use cutting paste or spray.*

Fitting the safety chain

1. Pass the safety chain through the frame grip opening;
2. Wrap the chain around the workpiece;
3. Securely close the chain using the lock.

WARNING: *Always use the safety chain when drilling vertically and/or upside down. The safety chain does not replace the magnetic force of the magnetic drilling machine: it is simply used to secure against falling in the event of a magnet malfunction.*

3.2 Prior to use

Please make sure that the contacting surface for the magnet is level, clean and rust free. Remove any varnish or primer. When working on materials that are not magnetisable, suitable fixation devices, for example suction plate, vacuum plate or pipe-drilling machine must be used. When working on steel materials with a material thickness of less than 6 mm (1/4"), the workpiece must be reinforced with an additional steel plate in order to guarantee the magnetic holding power.

Check the machine for possible damage. Before using the machine, you must carefully check the protective components or slightly damaged components to ensure they are operating perfectly and as intended. Check that moving parts are in perfect working order, do not jam and check whether the parts are damaged. All parts must be correctly installed and fulfill all conditions necessary to ensure perfect operation of the machine. Damaged protective components must be repaired or replaced according to specifications by the manufacturer.

DO NOT use under wet conditions or in presence of flammable liquids or gases.

DO NOT let children come into contact with the machine. Supervision is required when inexperienced operators use this machine.

Electrical safety

The electric motor has been designed for one voltage only. Always check that the power supply corresponds to the voltage on the rating plate. Your magnetic drilling machine is designed in class I (grounded) according to EN 61029-1. Earth wire is required. If the supply cord is damaged, it must be replaced by a specially prepared cord available through the service organisation.

Extension cable

If an extension cable is required, use an approved 3-core extension cable suitable for the power input of this machine (see technical data).The minimum conductor size in combination with this machine is 2.5 mm² (for 220V) or 10 AWG (Amperage Wire Gauge for 110V). The maximum length is 30 metre (± 100 feet).

WARNING: *When using a reel, always unwind the cable completely!*

Useful tips

- Try a few simple projects using scrap material until you develop a ‘’feel’’ for the magnetic drilling machine;
- Let the machine run in for a period of 8-10 hours before starting with big operations. Do not load the machine too much during this run-in period;
- Never use the machine with serious overload;
- Keep the machine clear from moisture at all times to protect the machine, yourself and others.

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4. Using the machine

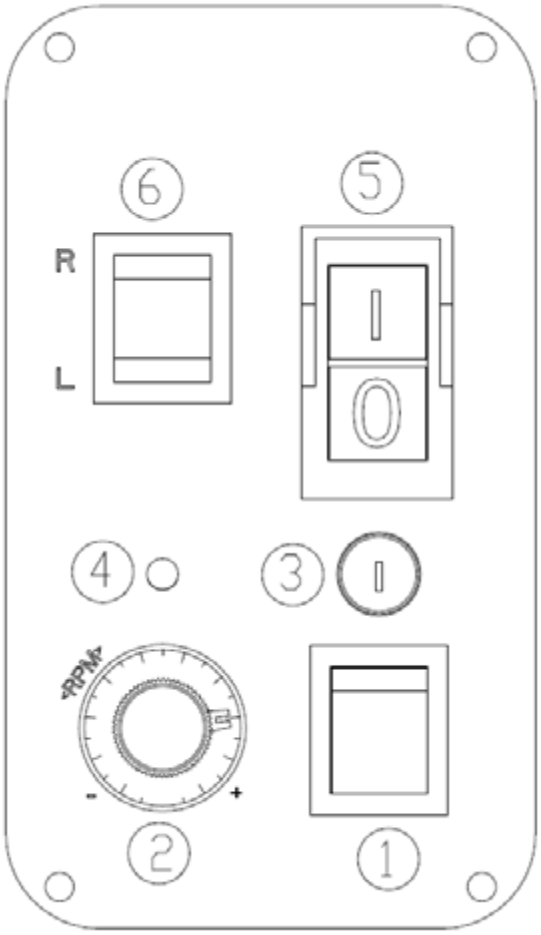
WARNING: *Always observe the safety instructions and applicable regulations.*

WARNING: *To reduce the risk of serious personal injury, turn the machine off and disconnect the machine from power source before making any adjustments or removing/installing attachments or accessories.*

4.1 Control panel

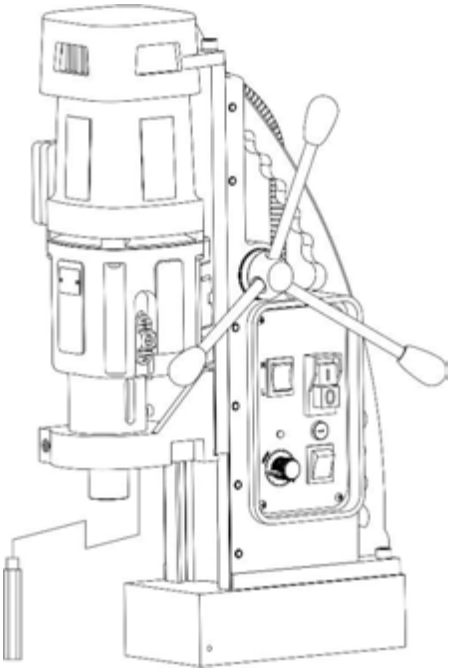
The control panel is designed for maximum ease of use and safety.

1. Magnet switch
2. Speed control knob
3. Fuse holder
4. Magnet LED indicator
5. Motor switch
6. R/L switch

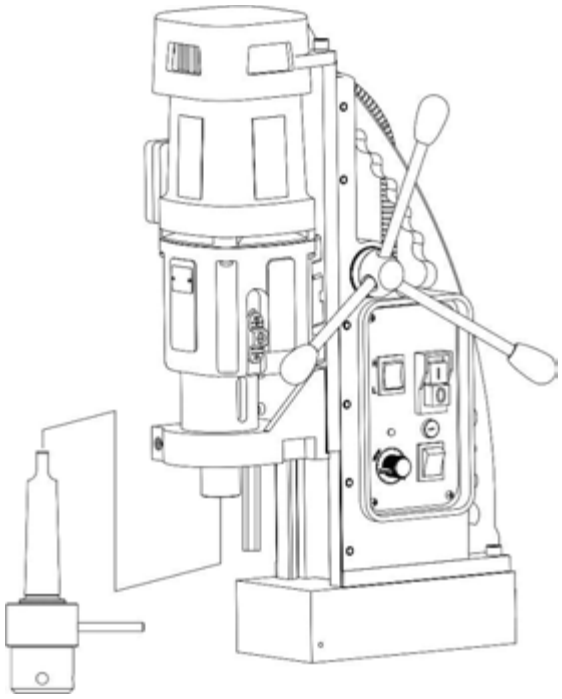


[image 4-1]

4.2 Morse taper arbor

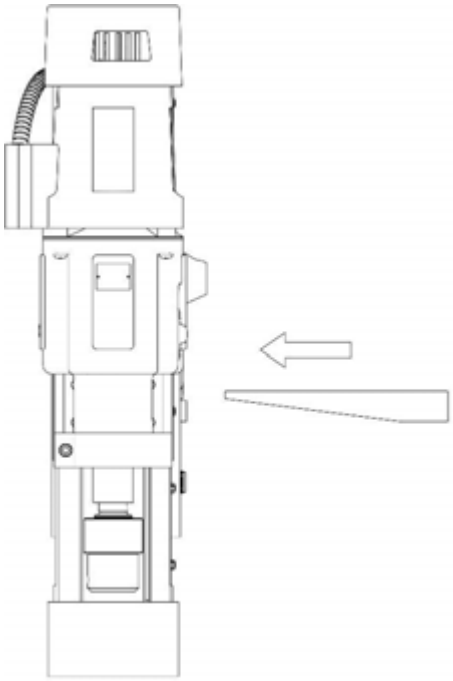


[image 4.2]



[image 4.3]

1. Make sure the inside of the output shaft and the Morse taper arbor are clean and free of grease;
2. Take the stop pin from the case and screw the threaded end in the motor bracket;
3. Position the rotation limiter on the lubrication ring of the arbor against the stop pin;
4. Firmly slide the Morse taper arbor into the output shaft by hand. Make sure the arbor is properly positioned. You should not be able to pull it out by hand;
5. To remove the Morse taper arbor:
   - Switch off the motor;
   - Rotate the mechanical gear switch to neutral (see § 4.4 Gearbox);
   - Rotate the output shaft until the slots on the shaft align with the slots on the gearbox;
   - Gently tap the supplied drift into the slots to push the Morse taper arbor out.

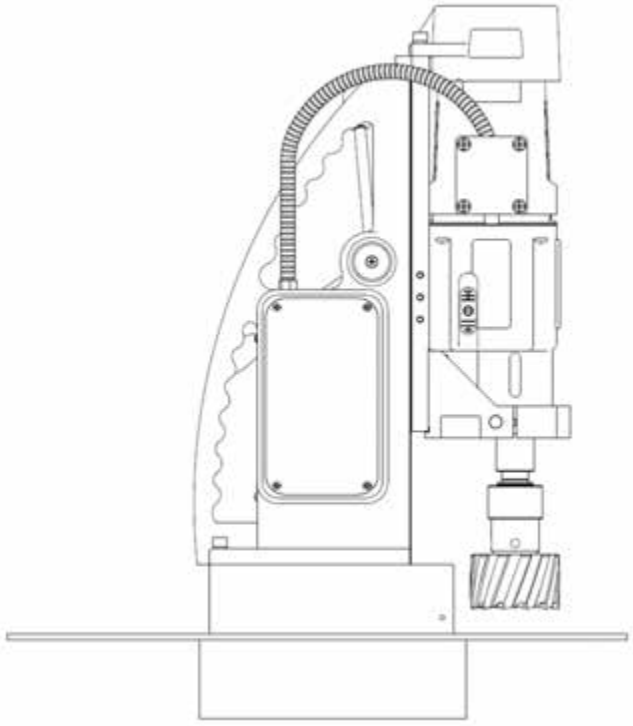


[image 4.4]

4.3 Electromagnet

Make sure the magnetic drilling machine is placed on a smooth, clean, level and solid surface without any objects or debris to guarantee maximum adhesion.

The workpiece must at least be 6 mm (1/4") thick for the magnet to stick and to drill safely. In case the workpiece is between 3 mm (1/8") and 6 mm (1/4"), make sure to make a proper base to create a good magnetic field as shown below.



[image 4-5]

The electromagnet will work best on surfaces of at least 10 mm (3/8") thickness.

When the magnet is not able to create a good enough magnetic field, this may be caused by:

- Surface not being flat;
- Workpiece is not magnetisable (e.g. aluminium);
- Workpiece is coated or painted;
- Workpiece is not thick enough.

In this situation the magnet indicator will light up red. Make sure to solve any of these matters before proceeding in any way and creating unsafe situations.

1. Connect the machine to the mains/workpiece;
2. To activate the magnet, press the red magnet switch:
   - The magnet switch will be lit (RED);
   - The LED-indicator lights up GREEN when generated magnetic force is sufficient;
3. To deactivate the magnet, press the same switch again.

⚠ ***WARNING:*** *Do not use this machine when LED-indicator is RED. Magnet may not generate sufficient attachment force.*

We want to point out that above mentioned precautions and indicators do not guarantee that the magnet will not release from the material. We accept no liability when it comes to the magnet indicator not functioning or functioning poorly.

Make sure that the magnet attaches tightly to the work piece before turning on the motor unit of the magnetic drilling machine. The magnets have two coils; make sure that both coils are in contact with the material. Do not connect any other machine to the same electrical outlet to which the magnetic drilling machine is plugged into, as it may result in the loss of magnetic force.

Always use the safety chain included. Drilling above your head is extremely dangerous and is not recommended. For the use of magnetic drilling machines on pipes, not-flat or non-magnetic materials, we refer to separately available vacuum tightening systems and pipe clamping systems.

4.4 Four-speed gearbox

This machine is equipped with a mechanical 4-speed gearbox. The 2 push and slide switches on the motor unit allow to select 4 speeds manually. Here's the selection table for annular cutters:

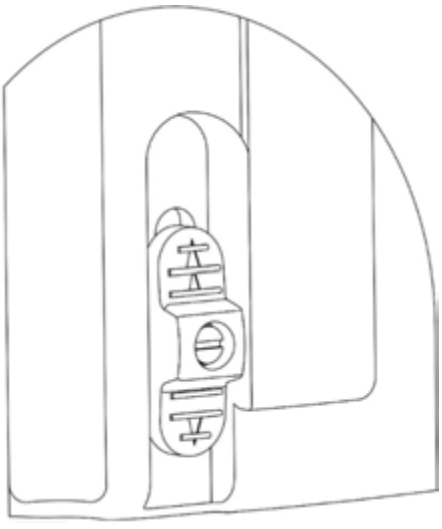
Gear	Front switch	Back switch	Speed	Cutter Ø	Cutter Ø
I	Up	Down	40 - 110 rpm	80 - 100 mm	3 1/8" - 3 15/16"
II	Down	Down	65 - 180 rpm	51 - 79 mm	2" - 3 1/8"
III	Up	Up	140 - 380 rpm	27 - 50 mm	1 1/16" - 2"
IV	Down	Up	220 - 610 rpm	12 - 26 mm	1/2" - 1"

Choose high speed gear setting for twist drills.

To select a gear, push the switch at the front of the motor unit of the machine and move it up or down to select the required gear in accordance with the table here above. The switch should come back up to lock the selected gear.

Repeat this for the rear switch.

In case you have trouble selecting a gear, the gears in the gearbox might be misaligned. Slightly rotate the output shaft by hand to align the gears and correctly and fully select the intended gear.



[image 4.6]

The machine also has an electronic speed control (see § 4.7). Important is that the closest mechanical gear is selected first and after that the speed can be altered (-/+) by electronic adjustment. For this purpose, keep the electronic speed knob around 50%.

4.5 Switching motor on and off

The motor unit can only be switched ON when the magnet is activated. To switch the motor ON, press the green button with marking "I". To switch the motor OFF, press the red button with marking "O".

4.6 Motor rotation

The rotational direction of the motor can be changed:

- Switch in up position (R) will make the motor rotate clockwise;
- Switch in down position (L) will make the motor rotate counter clockwise;

Before switching the rotational direction of the motor and spindle, make sure the motor is switched OFF first, to prevent machine and tool damage.

4.7 Motor speed control

The speed control knob (potentiometer) allows you to electronically control the speed of the motor (in both clockwise and counter clockwise direction):

- The indicator of the potentiometer in bottom left corner is minimum speed;
- The indicator of the potentiometer in bottom right corner is maximum speed;

The electronic motor speed control works for both mechanical gears. Be careful not to overturn the knob.

4.8 Torque control

Built-in electronic torque control will automatically stop the motor in case of overload. Adjust the torque by turning the red rotary knob at the backside of the motor unit into the "–" direction. Then push the red motor switch with "O" marking to reset the motor, and the green motor switch with "I" marking to start drilling again.

4.9 Overheat protection

This machine is supplied with an all-time electronic overheat protection. If the temperature of the motor unit runs up to 100-105° C (212-221 °F) the motor unit will stop. After a few minutes it can be started again. When it is possible to start the motor again, let the motor run idle at full speed for a couple of minutes to let the motor cool down more in an efficient way.

4.10 Tool lubrication

Horizontal applications

In order to use the lubrication system, the tank must be filled with a cutting lubricant.

1. Make sure the flow regulator is closed;
2. Unscrew the cap;
3. Fill the container with cutting lubricant;
4. Screw the cap back on.

- Adjust the fluid flow as required using the flow regulator;
- Add more cutting lubricant when the shavings (metal chips) become blue.

Vertical and overhead applications

Dip the cutter in cutting paste or apply an appropriate spray.

WARNING: *Do not use the lubrication system in vertical or overhead drilling applications. Instead use cutting paste or spray.*

Make sure to use only suitable cutting lubricants. Proper lubrication will help you create better and faster results, and extend the lifetime of your tools.

5. Working with drilling accessories

5.1 Annular cutters

Annular cutters only cut material at the periphery of the hole, rather than converting the entire hole to shavings. As a result, the energy required to make a hole is lower than for a twist drill. When drilling with an annular cutter, it is not necessary to drill a pilot hole.

⚠ ***WARNING:*** *Do not touch the cutter or the parts close to the cutter immediately after operation, as they may be extremely hot and cause burns to the skin. Ensure nobody is in the work area where the metal core (slug) is ejected.*

Drilling conditions

The ease with which material can be drilled depends on several factors including tensile strength and abrasion resistance. Whilst hardness and/or strength is the usual criterion, wide variations in machinability can exist among material showing similar physical properties.

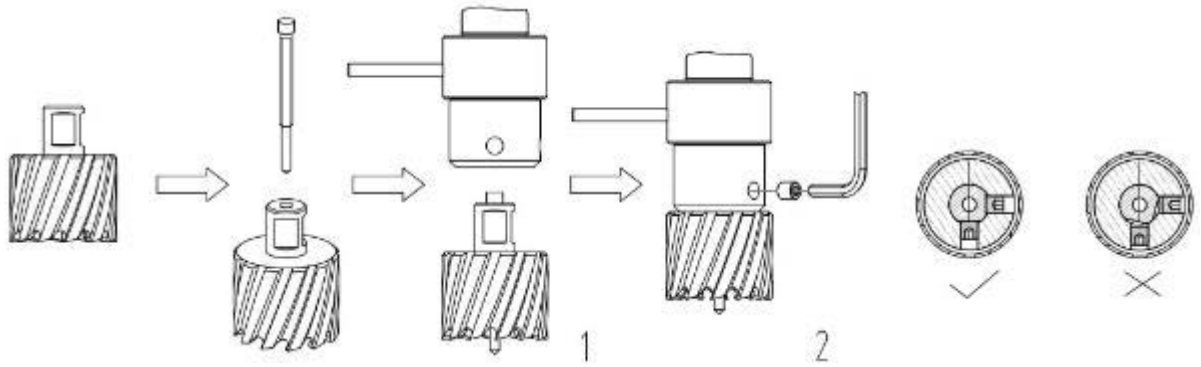
The drilling conditions are dependent on requirements for tool life and surface finish. These conditions are further restricted by the rigidity of the tool and the workpiece, lubrication and machine power available. The harder the material, the lower the cutting speed.

Some materials of low hardness contain abrasive substances leading to rapid cutting edge wear at high speeds. Feed rates are governed by rigidity of set-up, volume of material to be removed, surface finish and available machine power.

Drilling a hole

Now that you have read the information and safety recommendations above, you are ready to actually start drilling. Follow these 12 steps for best drilling result:

1. Install the annular cutter:
   - Place the pilot pin into the cutter;
   - Align the flat faces on the cutter shank with the screws in the tool holder;
   - Make sure the cutter shank is entered fully and correctly;
   - Tighten the screws;



[image 5-1]

2. Precisely mark the center of the hole;

3. Use the pilot pin to position the machine in the correct position, with the tip of the pilot pin to meet the marked center of the hole;

4. Switch on the magnet and verify that the drill is in the right position and that the machine is pushed tight against the work piece;

5. Open the valve of the lubrication system to release the cutting oil. Alternatively fill the holes of the spindle with oil;

6. Switch the motor on and allow it to run at the required speed;

7. Turn the feed handles to start drilling. Apply only a slight pressure when the annular cutter touches the metal. Do not push the annular cutter with force into the metal;

8. Apply a regular pressure while drilling. The drilling performance does not improve by putting more pressure on the machine. Too much pressure will overload the motor and your annular cutter will be worn sooner;

   A continuous, non-discoloured iron swarf is a sign of correct drilling speed and a well-cooled, sharp cutter. Let the cutter do the job and give it time to cut the metal!

9. Stop drilling regularly, refill the holes of the spindle and continue drilling;

10. Apply less pressure when the drill cuts through the material. The slug will be pushed out of the cutter by the pilot pin;

11. Turn the feed handles to put the motor in highest position and switch off the motor unit;

12. Remove the burrs, metal chips and clean the cutter and surface without getting injuries.

CAUTION: *The slug is sharp and may be hot!*

5.2 Twist drills

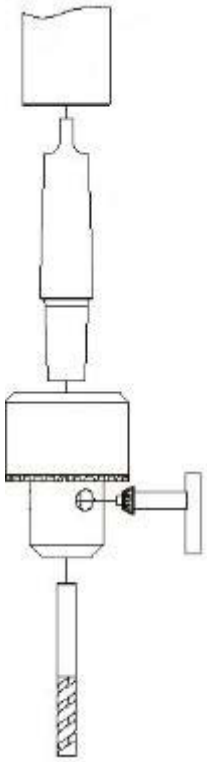
Weldon shank

Fit a twist drill with 19.05 mm (3/4") Weldon shank into the arbor and fasten the screws with the provided Allen key.

Follow the further steps in § 5.1 Annular cutters.

Standard parallel shank (DIN338)

1. Remove the Morse taper 3 (MT3) arbor for Weldon shanks (see § 4.2 Morse taper arbor)
2. Fit a MT3 arbor connection for
    a. 1/2" x 20 UNF drill chuck connections, or
    b. B16 drill chuck connections
3. Fit the appropriate twist drill chuck to the arbor
4. Fit the drill with parallel shank and fasten it



[image 5-2 I Example of fastening a drill with a key]

5. Precisely mark the center of the hole, and use the tip of the twist drill to position the machine.

For further steps see § 5.1 Annular cutters.

5.3 Tapping

The machine is equipped with counter clockwise rotation and is suitable for tapping holes.

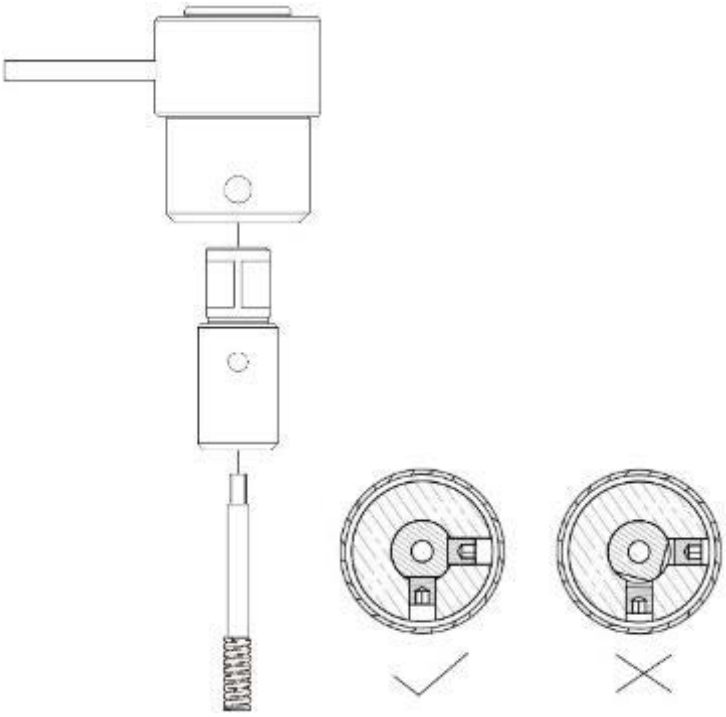
Drill taps with Weldon shank

1. Fit the drill with 19.05 mm (3/4") Weldon shank into the arbor and fasten the screws with the provided Allen key
2. Select the required gear and speed and set the direction of rotation to clockwise (right = R);
3. Switch on the motor and set the drill tap onto the workpiece with the feed handles;
4. To drill and tap the hole, guide the machine slide down with the handles without exerting;
5. Switch off the motor and set the direction of rotation to counter clockwise (left = L);
6. Switch on the motor again and allow the machine tap to come completely out of the work piece;
7. Guide the motor unit slide upwards with the feed handles to avoid damaging the start of the threaded hole.

Machine taps with adapter

1. Drill a hole first;
2. Switch off the machine and change the cutter for the tap collet and machine tap;

WARNING: *Do not move the machine!*



[image 5-5]

3. Select the lowest gear and speed and set the direction of rotation to clockwise (right = R);
4. Switch on the machine and set the machine tap onto the drilled hole;
5. Guide the machine slide down at the handle without exerting;

6. Switch off the machine (just before the tap is completely through the hole) and set the direction of rotation to counter clockwise (left = L);
7. Switch on the machine again and allow the machine tap to come completely out of the work piece. Then guide the motor unit slide upwards with the feed handles to avoid damaging the start of the thread.

WARNING: *Do not let your tap push up the motor unit by itself!*

Make sure to properly lubricate while performing tapping work, see § 5.1 Annular cutters.

5.4 Step drills and countersinks

Use drills for reaming or countersinking with 19.05 mm (3/4") Weldon shank and follow the steps mentioned in the previous paragraphs.

6. Maintenance

This machine is designed to operate over a long period of time with a minimum of maintenance. Continuous satisfactory operation depends upon proper tool care and regular cleaning.

⚠ ***CAUTION:*** *To reduce the risk of injury, turn unit off and disconnect machine from power source before installing and removing accessories, before adjusting or changing set-ups or when making repairs. Be sure the switch is in the OFF position. An accidental start-up can cause injury.*

Just as every machine with moving parts, your magnetic drilling machine also needs regular maintenance. A few recommendations follow:

VISUALLY CHECK THE MACHINE FOR DAMAGE
Machine must be checked before operation for any signs of damage that will affect the operation of the machine. Particular notice must be taken of the mains cable, if the machine appears to be damaged it should not be used failure to do so may cause injury or death.

CLEANING
- Clean all dirt, dust, metal chips and burrs of your magnetic drilling machine;
- Blow dirt and dust out of the main housing with dry air as often as dirt is seen collecting in and around the air vents. Wear approved eye protection and an approved dust mask;
- Never use solvents or other harsh chemicals for cleaning the non-metallic parts of the tool. These chemicals may weaken the materials used in these parts. Use a cloth dampened only with water and mild soap. Never let any liquid get inside the tool; never immerse any part of the tool into a liquid.

OPERATION OF THE MACHINE
The machines operation must be checked to ensure that all components are working correctly. Replace any defective parts immediately. This prevents properly function parts from being damaged.

CHECK MAGNETIC BASE
Before every operation the magnetic base should be checked to make sure that the base is flat and there is no damage present. An uneven magnet base will cause the magnet not to hold as efficiently and may cause injury to the operator. When the machine us put out of use for a longer period, apply a small amount of machine oil to the underside of the magnetic base for rust protection. Clean the magnetic base again with next use.

CHECK MACHINE GREASE
The gearbox grease should be checked 1 x month to ensure all moving components are covered to prevent wear. The grease should be changed at least 1 x year to ensure you gain the best from the machine.

CARBON BRUSHES
Brushes should be checked to make sure there is no abnormal wear present. This should be checked at least 1 x week if used frequently. If the carbon brush has worn more than 2/3 the original length the brushes should be changed. Replace both carbon brushes at the same time. Failure to do so may cause damage to the machine.

CHECK ARMATURE
This should be checked at least 1 x month to check that there are visual signs of damage to the body or to the commutator. Some signs of wear will be seen on the commutator over a period of time this is normal as this is the part that comes in contact with the brushes but any signs of abnormal damage and the part should be replaced.

ADJUSTMENT OF SLIDE
An essential requirement of the machine is that the slide can move in a smooth and controlled manner, free of lateral movement and vibration. This situation can be maintained by periodic adjustment of the slide and is accomplished in the following manner:

1. Place the machine in an upright position and, by means of the capstan, raise the slide to its highest position. Clean the aluminum rails and apply a small amount of light machine oil to the wear surfaces;
2. Gently feed in setting screw with supplied Allen key 2.5 until slight resistance is encountered. Follow your way down adjusting all setting nuts and screws;
3. Operate the slide up and down a few times to test the movement and make any further necessary adjustments. Try to ensure that all the screws are exerting a uniform pressure on the slide from top to bottom. A perfectly adjusted slide will operate freely up and down without any sideways movement.

LUBRICATING THE FEED TRAVEL
The feed travel should be lubricated periodically with grease to ensure smooth operation.

- Raise the motor unit to the highest position possible;
- Lubricate the dove-tail guide way at both sides;
- Lubricate the gear rack.

After repeated use, the gear rack may become loose. If necessary, adjust the self-locking set screws at the left side. Tighten screws in series until the gear rack moves freely in the dove-tail guide but does not allow the motor to wobble.

REPAIR, MODIFICATION AND INSPECTION
Repair, modification and inspection of magnetic drilling machines must be done an authorised dealer. The spare parts list will be helpful if presented with the machine to the dealer for service when requesting repair or other maintenance.

Our machines are constantly being improved and modified to incorporate the latest technological advancements. Accordingly, some parts (i.e. part numbers and/or design) may be changed without prior notice. Also, due to our continuing program of research and development, the specifications of machines are subject to change without prior notice.

WARNING: *If accessories have not been tested with this product, use of such accessories with this tool could be hazardous. To reduce the risk of injury, only recommended accessories should be used with this product.*

Consult your dealer for further information on the appropriate accessories.

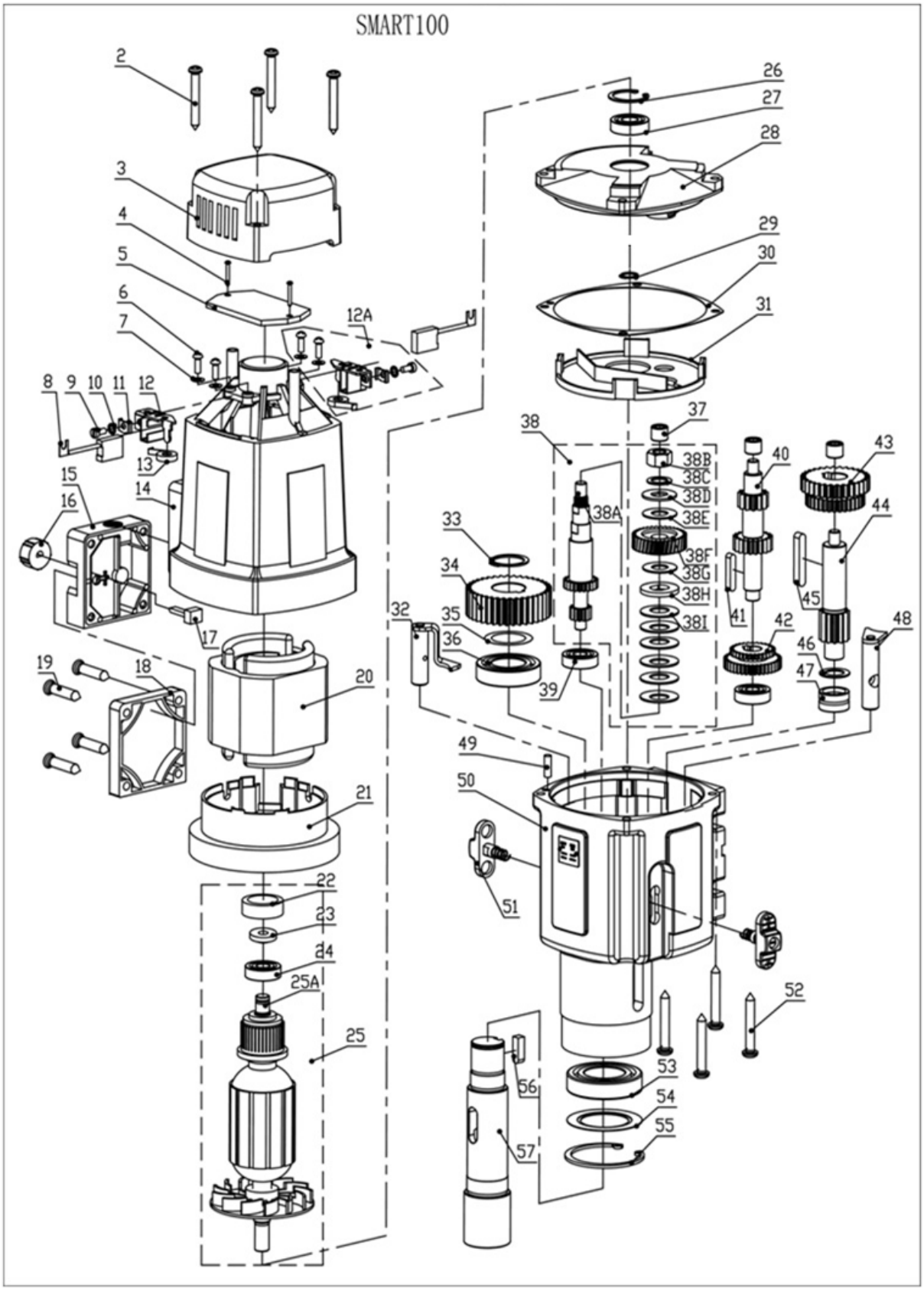
7. Trouble shooting

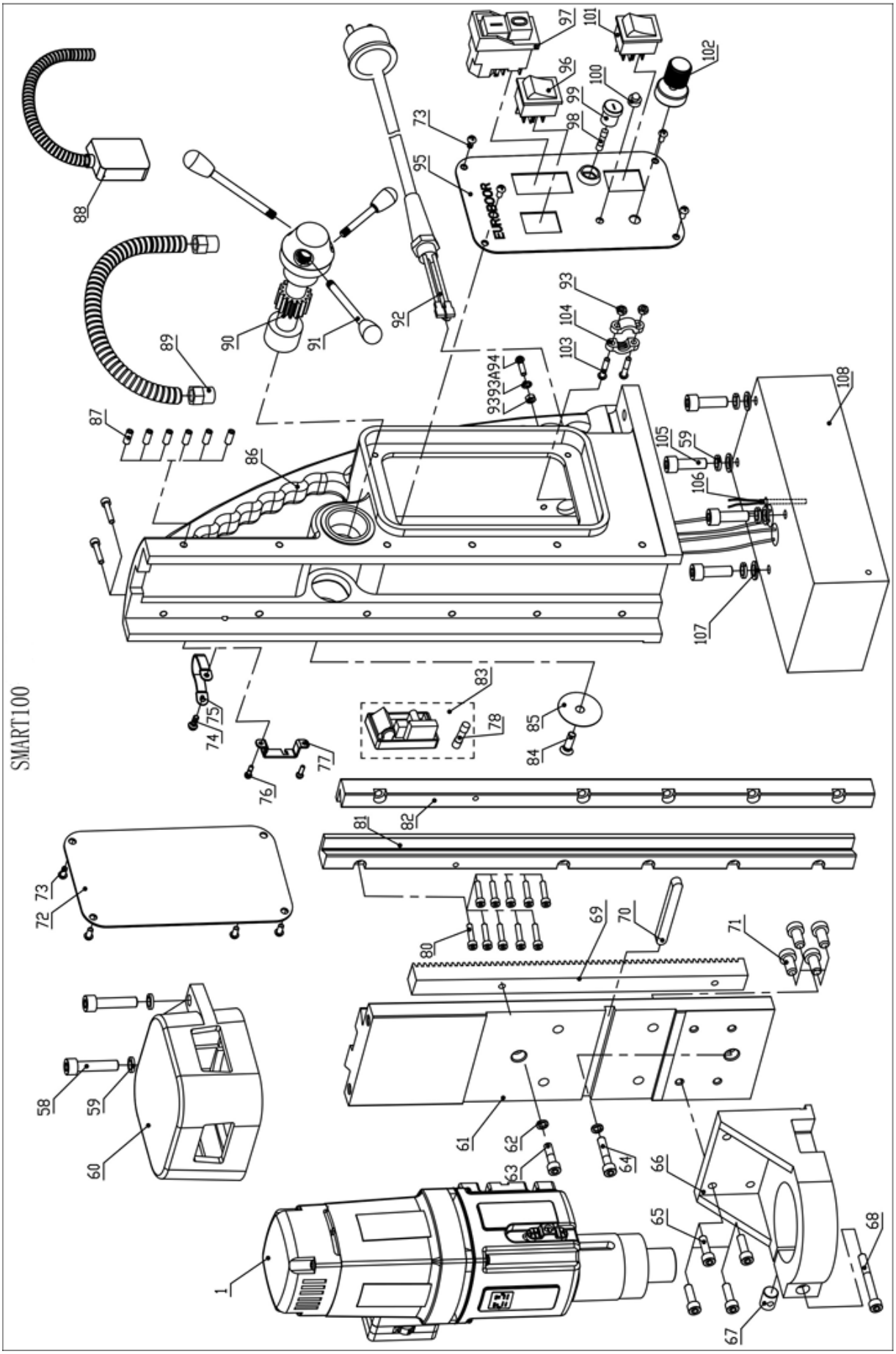
Magnet and motor do not function	- The magnet switch is not connected to the power supply - Damaged or defective wiring - Defective fuse - Defective magnet switch - Defective control unit - Defective power supply
Magnet does function, the motor does not work	- Damaged or defective wiring - Carbon brushes are stuck or worn out - Defective magnet switch - Defective On / Off switch - Defective control unit - Defective armature and/or field
Magnet does not function, the motor does	- Defective magnet - Defective wiring of magnet - Defective control unit
Annular cutters break quickly, holes are bigger than the annular cutter	- Clearance in the guide - Bent spindle - Shaft extending from the motor is bent - Bent pilot pin
Motor running roughly and/or seizing up	- Bent spindle - Shaft extending from the motor is bent - Triangular guide not mounted straight - Dirt between spindle and triangular guide
Motor starts running when magnet switch is turned on	- Damage or defective relay in control unit
Motor making a rattling sound	- Gear ring (bottom of the armature) worn out - Gear(s) worn out - No oil in gearbox
Motor humming, big sparks and motor has no force	- Armature damaged (burned) - Field burned - Carbon brushes worn out
Motor does not start or fails	- Damaged or defective wiring - Dirt in sensor control unit - Defective or loose magnet on top of armature - Damaged or defective (sensor) control unit - Damage to armature or field coil - Damaged or defective carbon brushes
Guiding takes a great deal of effort	- Guide is set too tight - Guide is dry, needs to be greased - Guide/gear- rack/rotation system dirty or damaged
Insufficient magnetic force	- Damaged or defective wiring - Bottom of magnet not clean and dry - Bottom of magnet not flat - Workpiece is not bare metal - Workpiece is not clean or flat - Workpiece is less than 6 mm (too thin) - Defective control unit - Defective magnet

Frame under voltage	- Damaged / defective wiring - Defective magnet - Motor seriously dirty
Fuse blows when magnet switch is turned on	- Damaged or defective wiring - Wrong value fuse - Defective magnet switch - Defective control unit - Defective magnet
Fuse blows when motor is started	- Damaged or defective wiring - Wrong value fuse - Motor running roughly - Defective armature and / or field - Carbon brushes worn out - Defective control unit
Rotation system free stroke too long	- Loose or defective gear rack - Defective rotation system

8. Exploded views & spare parts list

8.1 Exploded views

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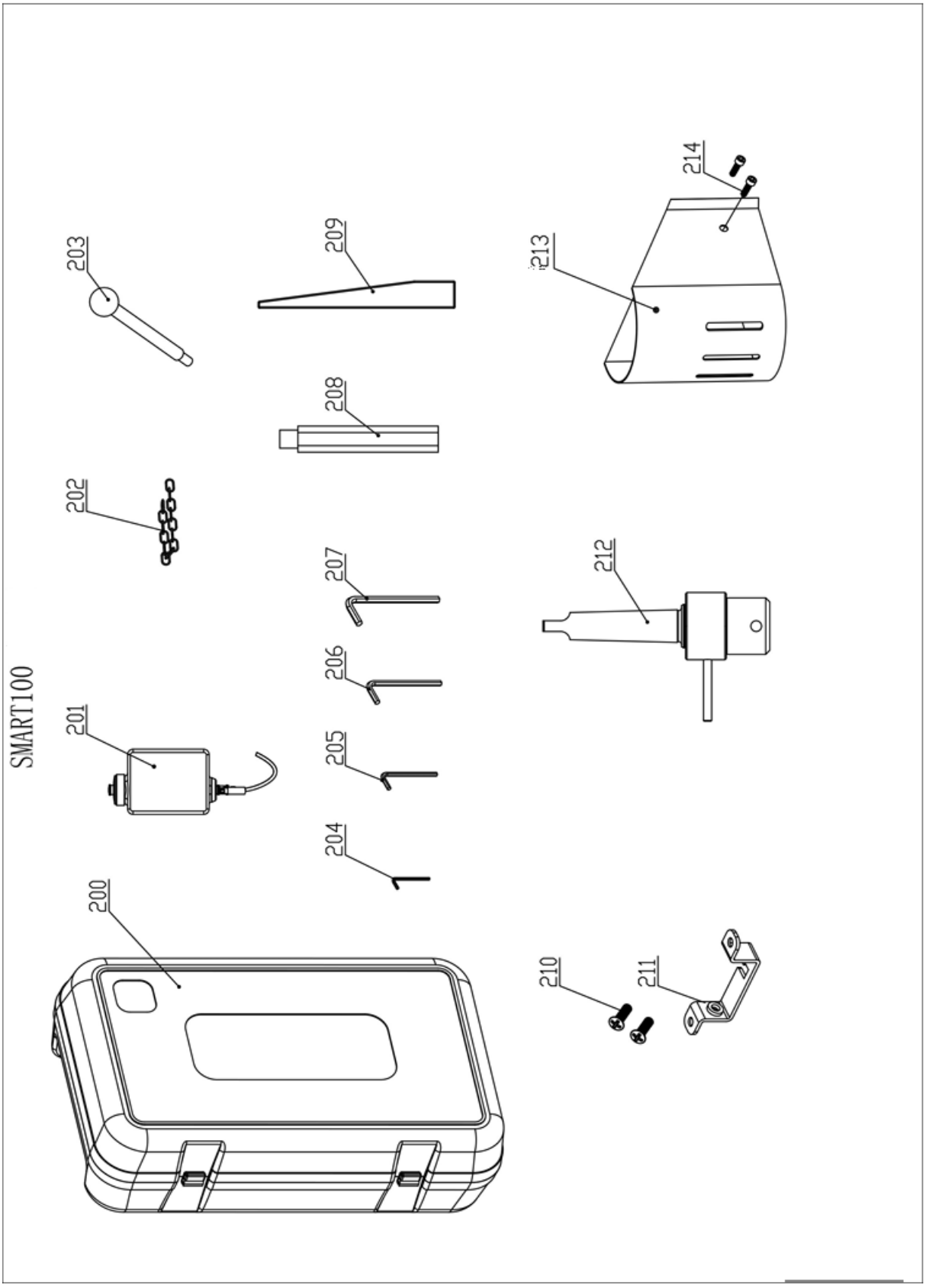
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8.2 Spare parts list

No.	Part no.	Description	Qty
1	100M.1001	Motor unit 220V	1
	100M.1001A	Motor unit 110V	
2	050.0106	Screw 4.8 x 45	4
3	100.0322-01	End cover	1
4	032.0116	Screw M4 x 16	2
5	100.4333	Speed control unit 220V	1
8	100.0368	Carbon brush set 220V	1
	100.0369	Carbon brush set 110V	
12A	100.0372	Carbon brush holder assembly	2
14	100.4388	Housing	1
15	100.4576	Torque switch housing	1
16	100.4574	Wheel red	1
17	100.4573	Torque potentiometer	1
18	100.0611	Torque/speed switch cap	1
19	100.0617	Screw PKVZ 6 x 45	4
20	100.4383	Field 220V	1
	100.4384	Field 110V	
21	100.0391	Baffle	1
22	100.0346	Rubber fitting ring	1
23	100.0348	Armature speed disk 1800W/1900W	1
24	080.0351	Bearing 6000	1
25	100.4318	Armature 220V 1900W	1
	100.4319	Armature 110V 1900W	
26	032.0166	Circlip 472/28/1.2	1
27	032.0171	Bearing 6001ZZ 12x28x8	1
28	100.4401/RB	Inner gear plate	1
29	100.0571	Circlip 471 11 x 1	1
30	100.0458	Gasket	1
31	100.4621	Plate for gear casing	1
32	080.4342	Clutch shaft 1	1
33	100.0426	Circlip 471 24 x 1.2	1
34	080.4324	Spindle gear 38T	1
35	080.4411	Adapter ring	1
36	100.0446	Bearing 6005	1
37	040.0161	Needle bearing HK0810	3
38	100.4312	Friction clutch complete assembly (7T)	1
38A	080.4321	Axle 1 (ECO.80 -> 1412)	1
39	080.0506	Bearing	2
40	100.4321	Axle 1 28+13T	1
41	040.0301	Key	1
42	100.4491	Double gear 1 25T+39T	1
43	100.4320	Double gear 2 36T+41T	1
44	100.4334	Axle 3 (13T)	1
45	080.0526	Key 3	1
46	080.4486	Washer 14 x 22 x 1	1
47	080.0481	Needle bearing	1
48	080.4336	Clutch shaft 2	1
49	100.0549	Casing pin	1

No.	Part no.	Description	Qty
50	100.1017HX	Gear box	1
51	040.0286	Gear switch	2
52	100.0459	Screw BK 5.5 x 45	4
53	100.0466	Bearing 6006	1
54	080.4476	Adapter ring	1
55	100.0471	Circlip 472/55	1
56	080.0431	Spindle key 6 x 6 x 20	1
57	100.0461	Drive shaft 38 x 158	1
58	100.0126	Screw SS M8 x 35	2
59	100.0031	Washer M8	6
60	100.0122	Motor fixing plate	1
61	080.0041	Slide	1
62	020.0111	Washer M6 DIN7980	2
63	020.0146	Screw M6 x 25	1
64	100.0066	Screw SS M6 x 30	1
65	020.0156	Bolt M6 x 20	4
66	100.0046HX	Motor holder	1
67	100.0046/A	Screw with nut	1
68			
69	100.0076	Rack	1
70	020.0512	Key 8 x 7 x 70	1
71	020.0513	Screw SS M8 x 16	4
72	100.0016M	Rear panel MAG100 220V	1
	100.0016MA	Rear panel MAG100 110V	
73	020.0101	Panel screw BKVZ M4 x 8	8
74	KSP.MS	Screw M5 x 10	1
75	020.0298	Motor cable clamp	1
76	KSP.MS	Screw M5 x 10	2
77	KSP.M/3	Tank holder	1
78	020.0017	Fuse 5 x 20 F2A	1
80	100.0022	Bolt M5 x 20	12
81	100.0193A	Aluminium rail (L) 22 x 18.5 x 442.5	1
82	100.0193B	Aluminium rail (R) 22 x 18.5 x 442.5	1
83	020.0001/2	Control unit 220V YSW model 1	1
	020.0001/21	Control unit 110V YSW model 1	
84	020.0081	Screw BKVZ M6 x 16	1
85	020.0077	End plate	1
86	100M.1002	Frame	1
87	020.0516	Screw M5 x 10	6
88	100M.1010	Motor cable set	1
89	020.0041	Coupling nut PG9 (motor cable)	2
90	100.0101	Capstan hub assembly	1
91	100.0116	Arm for capstan	3

No.	Part no.	Description	Qty
92	032.1016	Main cable set 220V EU	1
	032.1016A	Main cable set 110V US	
	020.0036/AU	Main cable 220V AU	
	020.0036/UK	Main cable 220V UK	
	020.0036/UK 110-32A	Main cable 110V UK 32A	
	020.0031	Coupling nut PG11 (main cable)	1
93	020.0182	Grounding screw/washer/nut	1
93A			
94			
95	100.0008M	Front panel MAG100	1
96	036.0072	L/R switch	1
97	030E.0091/Y	Motor switch 220V (5-pin) yellow	1
98	020.0017	Fuse 5 x 20 F2A	1
99	020.0016	Fuse holder	1
100	020.0206	LED indicator set	1
101	020.0011/1	Magnet switch	1
102	100M.1009	Potentiometer (turn) knob	1
93	020.0037	Cable clamp complete	1
103			
104			
105	100.0006	Screw SS M8 x 25	4

No.	Part no.	Description	Qty
106	020.0201	Sensor	1
107	020.0305	Washer M8	4
108	100.1004E	Magnet 220V	1
	100.1004EA	Magnet 110V	
200	100M.2001	Case MAG100 (with sticker)	1
201	KSP.Q2	Coolant tank Quick Connect 2015	1
202	SAF.400	Safety chain (1 mtr) with lock	1
203	KSP.P	Pin and knob for cooling tank	1
204	IMB.US2.5	Allen key 2.5 mm	1
205	IMB.US4	Allen key 4.0 mm	1
206	IMB.US5	Allen key 5.0 mm	1
207	IMB.US6	Allen key 6.0 mm	1
208	100.0051	Stop pin	1
209	DRIFT3	Drift MT3	1
210	KSP.MS	Screw M5 x 10	2
211	KSP.M/3	Tank holder	1
212	IMC.30/19-N	Arbor MT3 - 19.05 (3/4") Weldon	1
213	SAF.MDM	Safety guard	1
214	020.0223	Screw M5 x 10	2

8.3 Wiring diagram