

Operators manual
version 1.5 EN

 **EUROBOOR**
FOR PROFESSIONALS BY PROFESSIONALS

Magnetic drilling machine

ECO.55-A / ECO.55-TA

Serial no.: _____

Date of purchase: _____

Congratulations on your purchase of the Euroboor ECO.55-A / ECO.55-TA portable magnetic drilling machine. Your model is designed to produce superior holes quickly and efficiently. Through years of experience, constant innovation and development, Euroboor is committed to provide you with metal cutting tools and products to help you be more productive.

Before operating your new magnetic drilling machine, please read all instructions first. These include the Operators Manual and warning label on the unit itself. With proper use, care and maintenance your model will provide you with years of effective hole drilling performance

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

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1. Safety

1. 1 General safety instructions

Do not use this power tool before you have thoroughly read and completely understood this Instruction Manual and the “General Safety Instructions”, 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 including following.

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

This Operator’s Manual including the “General Safety Instructions” should be kept for later use and enclosed with the power tool, should it be passed on or sold.

WORK AREA

1. Keep your work area clean and well lit. Cluttered benches and dark areas invite accidents.
2. Do not operate magnetic drilling machine in explosive atmospheres, such as in the presence of flammable liquids, gases or dust. Magnetic drilling machine may create sparks which may 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. Magnetic drilling machine plugs 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 magnetic drilling machines 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 cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock.
5. When operating a magnetic drilling machine, use an extension cord suitable for outdoor use. Use of a cord suitable for outdoor use 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) protected supply. Use of an RCD reduces the risk of electric shock.

PERSONAL SAFETY

1. Stay alert, watch what you are doing and use common sense when using a magnetic drilling machine. Do not use machine while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating magnetic drilling machines may result in serious personal injury.

2. Dress properly. Do not wear loose clothing or jewelry. Contain long hair. 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 switch is off before plugging in. Carrying magnetic drilling machines with your finger on the switch or plugging in magnetic drilling machines that have the switch on invites accidents.
4. Never place hands, fingers, gloves or clothing near cutting 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 magnetic drilling machine in unexpected situations.
7. Use safety equipment. Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.
8. Always use supplied safety chain during any work on non-horizontal components. Mounting can release.

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. During machine operations, the annular cutter must be cooled and lubricated with good quality cutting or lubrication oil. Remove the slug from the annular cutter after each hole. Caution, the slug may be hot!
3. Use clamps or other practical way to secure and support the work piece to a stable platform. Holding the work by hand or against your body is unstable and may lead to loss of control.
4. Do not use machine if switch does not turn it on or off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.
5. 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.
6. Store idle magnetic drilling machines out of reach of children and other untrained persons. Tools are dangerous in the hands of untrained users.
7. Maintain machines with care. Keep cutting tools sharp and clean. Properly maintained tools, with sharp cutting edges are less likely to bind and are easier to control.
8. Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the machine operation. If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.
9. Use only accessories that are recommended by Euroboor for your model. Accessories that may be suitable for one machine, may become hazardous when used on another machine.

SERVICE

- Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury.
- When servicing a tool, use only identical replacement parts. Follow instructions in the maintenance section of this manual. Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electric shock or injury.
- When using this machine, you **MUST** wear ear and eye protection.

1.2 Specific safety information

- Keep your fingers well out of the drill area;
- Avoid touching the drilled core that is automatically ejected by the centering pin when the working procedure is finished. Contact with the core when it is hot, or if it falls, can cause personal injuries;
- Always use the drill guard. Before switching on machine ensure the guard is closed securely;
- Always use the safety strap;
- The magnetic drilling machine is suitable for use on steel with a thickness starting from 5 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 irregularly 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 until it has been mounted and installed according to these instructions;
- Do not switch on the machine before having checked that the magnetic stand has been tightened firmly to the mounting surface;
- Adjust the table so cutter does not extend into the work piece before drilling. Do not perform any design, assembly or construction activities on the work piece while the machine is switched on;
- Before switching on the machine, make sure all accessories have been mounted correctly;
- Always use the recommended speed for the accessories and the material;
- Do not use the machine on the same work piece on which electric welders are being used;
- Use only an appropriate cutting fluid. We offer a range of premium cutting oils and lubricants which are specially developed and selected for optimum performance and maximum tool life;
- 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 chuck guard operates properly;
- Ensure that metal chips or resinous residue cannot lead to blockage of the function;
- In case of jammed cutter disconnect the machine from the power supply, remove the reason for the jam before turning on the machine again.
- Always check if the situation before drilling in automatic mode is safe. Stay close by to the machine and keep a close eye to the automatic drilling process to be ready to switch of the machine whenever there is need to, especially when drilling in automatic mode.

RESIDUAL RISKS

In spite of the application of the relevant safety regulations and the implementation of safety devices, 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.

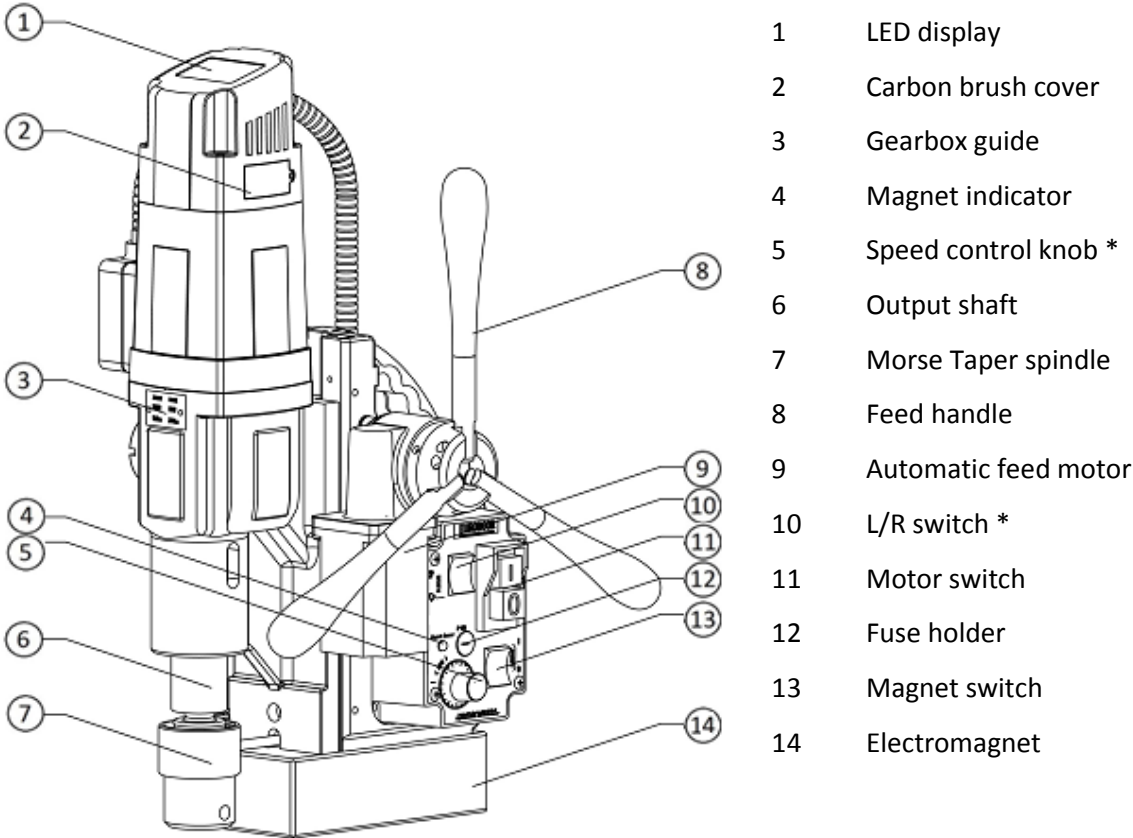
2. Description

2.1 Intended use

This magnetic drilling machine is intended for commercial use as a drilling machine for drilling materials with a magnetizable surface using annular cutters and twist drills, and for countersinking reaming and tapping (ECO.55-TA only) in a weather-protected environment using the application tools and accessories recommended by EUROBOOR.

The magnetic drilling machine can be used horizontally, vertically or overhead.

2.2 Description and features



* ECO.55-TA only

[image 1-1]

2.3 Box contents

- 1 Carrying case
- 1 Magnetic drilling machine
- 1 Instruction manual
- 3 Handles
- 1 Drill guard + 2 bolts
- 1 Oil tank + attachment pin
- 1 Bottle cutting oil
- 3 Allen keys (2.5, 4, 5)
- 1 Safety chain
- 1 Morse Taper 3 spindle
- 1 Spindle drift
- 4 Tap collets (DIN 376 M10/M12/M14/M16) *
- 1 Set of ear plugs
- 1 Pair of safety glasses
- 1 Pair of gloves

* ECO.55-TA only

2.4 Serial number

The serial number is mentioned on the machine 3 times: engraved on the frame and magnet, plus 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 and your sales point validate and identify the machine.

As example:

055T1501001







breaks down to:

<i>055T</i>	<i>15</i>	<i>01</i>	<i>001</i>
Machine series			
	Year of manufacture		
		Month of manufacture	
			Identification number

2.5 Technical data

	ECO.55-A		ECO.55-TA	
ANNULAR CUTTERS	∅ 12 – 55 mm	∅ 1/2" – 2-3/16"	∅ 12 – 55 mm	∅ 1/2" – 2-3/16"
TWIST DRILLS	∅ 1 – 23 mm	∅ 1/16" – 15/16"	∅ 1 – 23	∅ 1/16" – 15/16"
THREADING	-	-	M3 – M20	∅ 1/8" – 1-3/16"
COUNTERSINKING	∅ 10 – 60 mm	∅ 3/8" – 2-3/8"	∅ 10 – 60 mm	∅ 3/8" – 2-3/8"
LENGTH	345 mm	13-9/16"	345 mm	13-9/16"
WIDTH	210 - 280 mm	8-1/4" – 11"	210 – 280 mm	8-1/4" – 11"
HEIGHT	490 – 660 mm	19-5-16" - 26"	490 – 660 mm	19-5-16" - 26"
STROKE	170 mm	6-11/16"	170 mm	6-11/16"
WEIGHT	15,8 kg	35 lbs	15,8 kg	35 lbs
MAGNET (L x W x H)	170 x 85 x 50 mm	6-1/16"x 3-3/8" x 1-7/8"	170 x 85 x 50 mm	6-1/16"x 3-3/8" x 1-7/8"
MAGNETIC FORCE	1850 kg	4100 lbs	1850 kg	4100 lbs
MOTOR POWER	1600 W	14.5 A	1600 W	14.5 A
TOTAL POWER	1700 W	15.6 A	1700 W	15.6 A
SPEED	[I] 275 ^{min-1} [II] 500 ^{min-1}		[I] 60-275 ^{min-1} [II] 100-500 ^{min-1}	
SPINDLE	Morse Taper 3 – 19,05mm Weldon		Morse Taper 3 – 19,05mm Weldon	
POWER SOURCE	110 – 120V AC / 60 Hz 220 – 240V AC / 50 – 60 Hz		110 – 120V AC / 60 Hz 220 – 240V AC / 50 – 60 Hz	

2.6 Symbols

Symbol	Term, meaning	Explanation
	Read documentation	Be absolutely sure to read the enclosed documentation such as the Instruction Manual and the General Safety Instructions.
	Wear ear protection	Use ear protection during operation.
	Wear eye protection	Use eye-protection during operation.
	Danger/warning/caution	Observe the information in the adjacent text!
	European conformity symbol	Confirms the conformity of the power tool 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 length, width, height or depth
kg	Kilogram	Unit of measure for the mass
V	Volt	Unit of measure for the electric voltage
A	Ampere	Unit of measure for the electric current intensity
W	Watt	Unit of measure for the output
N	Newton	Unit of measure for the force
min	Minutes	Unit of measure for the time
no	No-load speed	Revolution speed at no-load
1/min	per minute	Unit of measure for number of revolutions, strokes, impacts or oscillations per minute.

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 by the retailer when you purchase a new product.

3. Preparation & adjustment

3.1 Assembly



WARNING: 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 all switches are in the OFF position. An accidental start-up can cause injury.

CHECKING THE FEED HANDLES

1. The three feed handles are pre-assembled on the machine
2. Check if the feed handles are fitted tightly. It should be possible to loosen and tighten them by hand.

Be careful not to cross-thread any of the components.

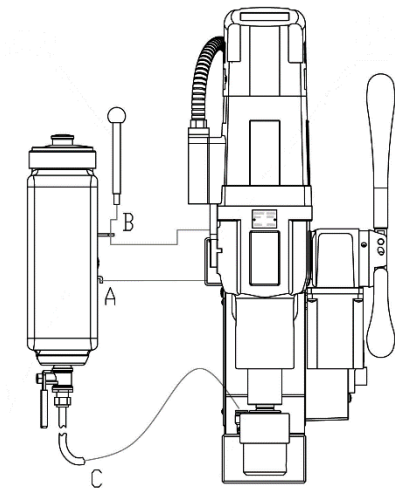
MOUNTING THE DRILL GUARD

The guard protecting against chippings and accidental contact must always be mounted during operation.

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



WARNING: Always use the Safety guard.



FITTING THE LUBRICATION SYSTEM

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

1. Hang the coolant tank (A) on the coolant tank holder
2. Position and tighten the attachment pin (B)
3. Connect the coolant hose (C) to the fitting on the Morse Taper spindle. Make sure the hose is connected fully and tightly
4. To disconnect the coolant hose, press the blue ring on the connection and gently pull out the hose

[image 2-1]

FITTING THE SAFETY CHAIN

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



WARNING: Always use the safety chain when using machine vertically and/or up-side-down.

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 magnetizable, suitable fixation devices, obtainable as accessories from EUROBOOR, e. g. suction plate, vacuum plate or pipe-drilling device must be used.

When work on steel materials with a material thickness of less than 5 mm, the work piece 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 protective devices or slightly damaged components to ensure they are operating perfectly and as intended.

Check that moving are in perfect working order and do not jam and check whether parts are damaged. All parts must be correctly installed and fulfill all conditions necessary to ensure perfect operation of the machine.

Damaged protective devices and parts must be repaired or replaced according to specifications by EUROBOOR or any authorized EUROBOOR dealer.

DO NOT use under wet conditions or in presence of flammable liquids or gases. This magnetic drilling machine is a professional power tool.

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 EUROBOOR 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 EUROBOOR service organization.

EXTENSION CABLE

If an extension cable is required, use an approved 3-core extension cable suitable for the power input of this tool (see technical data). The minimum conductor size is 1.5 mm²; the maximum length is 30 meter. When using a cable reel, always unwind the cable completely.

TRY A FEW SIMPLE PROJECTS USING SCRAP MATERIAL UNTIL YOU DEVELOP A "FEEL" FOR THE 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 RUN-IN PERIOD

NEVER USE THE MACHINE IN SERIOUS OVERLOAD

KEEP THE MACHINE CLEAR FROM MOISTURE AT ALL TIMES TO PROTECT THE MACHINE, YOURSELF AND OTHERS.

4. Using the machine



WARNING: Always observe the safety instructions and applicable regulations.



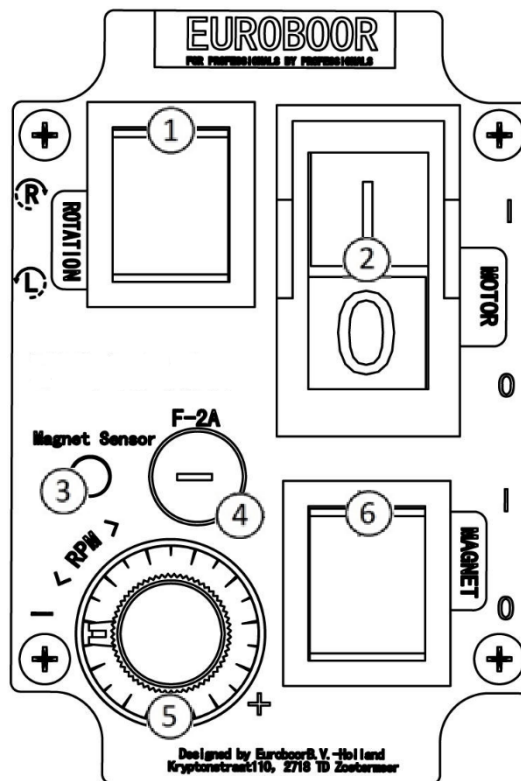
WARNING: To reduce the risk of serious personal injury, turn tool off and disconnect tool from power source before making any adjustments or removing/installing attachments or accessories.

4.1 Control panel

The control panel on your magnetic drilling machine is designed for maximum operating facility and safety.

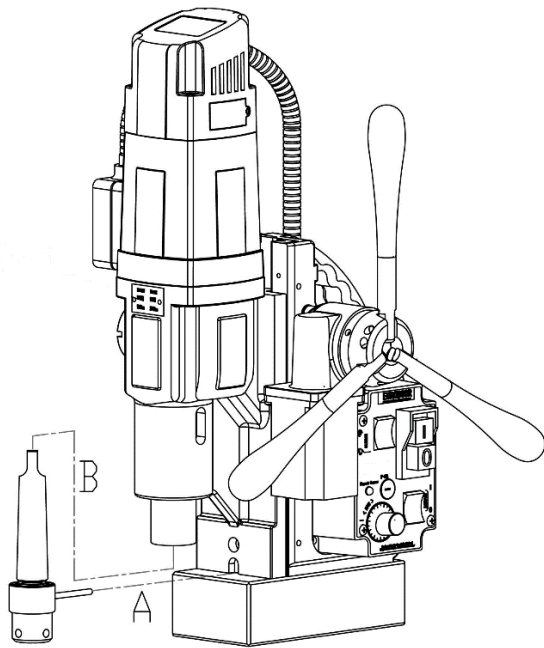
1. L/R Switch *
2. Motor Switch
3. Magnet LED Indicator
4. Fuse holder with Fuse
5. Speed control knob *
6. Magnet Switch

* ECO.55-TA only

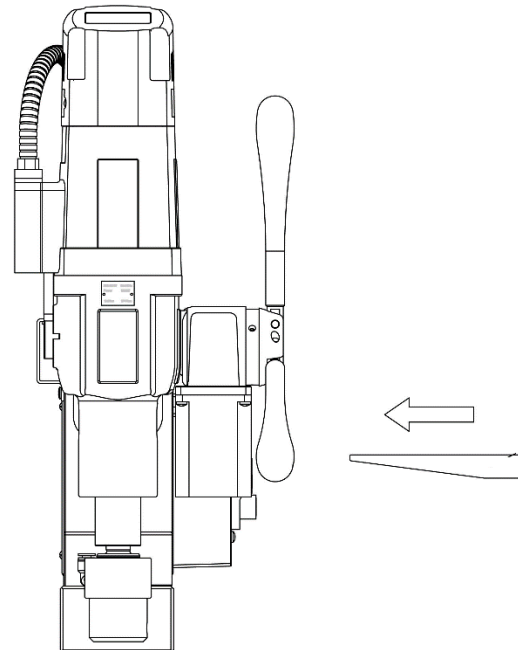


[image 2-2]

4.2 Morse taper spindle



[image 2-3]



[image 2-4]

1. Make sure the inside of the output shaft and the Morse Taper spindle are clean and free of grease
2. Align the coolant ring rotation limiter with the recess in the gearbox (A)
3. Firmly slide the Morse Taper spindle into the output shaft by hand (B). Make sure the spindle is properly positioned. You should not be able to pull it out by hand.
4. To remove the Morse Taper spindle
 - Switch of the motor
 - Rotate the mechanical gear switch to neutral (see chapter 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

4.3 Gearbox

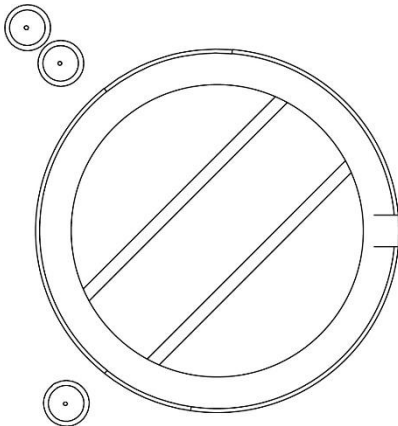
1. To select the correct gear from neutral (horizontal) position:
 - a. Rotate the switch counterclockwise to position **o**, this is gear 1
 - b. Rotate the switch clockwise to position **oo**, this is gear 2
2. A gear is only correctly selected when the gearbox switch is aligned with the indicators on the gearbox.

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

NOTE: never touch moving machine parts!

3. Speed selection for annular cutters (also see plate on gearbox):

o	∅ 27-55 mm	Rotating speed 275 ^{min-1} (ECO.55-A) or 60-275 ^{min-1} (ECO.55-TA)
oo	∅ 12-26 mm	Rotating speed 500 ^{min-1} (ECO.55-A) or 100-500 ^{min-1} (ECO.55-TA)



[image 2-5]

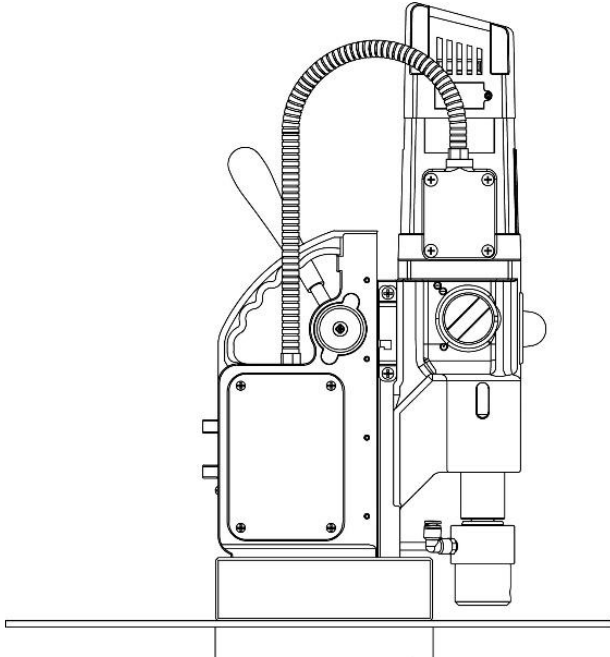


WARNING: *never touch moving machine parts!*

4.4 Electromagnet

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

The workpiece must be at least 5 mm thick for the magnet to stick, but minimal 3 mm thick to hold the weight of the machine and to drill safely. In case the workpiece is between 3 and 5 mm, make sure to make a proper base to create a good magnetic field as shown in image 2-6.



[image 2-6]

The electromagnet will work best on surfaces of at least 10 mm thickness.

The electromagnet may not be able to create a good enough magnetic field. Causes may be:

- Surface not flat
- Workpiece not magnetizable (e.g. aluminium)
- Workpiece coated or painted
- Workpiece 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/work piece
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 need to point out that this is only an indication and not a certainty that the magnet will not release from the material. Euroboor accepts no liability ensuring from 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. Euroboor magnets have 2 coils; make sure that both coils are in contact with the material. Do not connect any other machines to the electrical outlet 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 our brochure or our website www.euroboor.com where several vacuum tightening systems and pipe clamping systems are mentioned.

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

ECO.55-T only

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 anticlockwise
- Switch in middle position will not make the motor rotate (neutral position)

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

ECO.55-T only

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

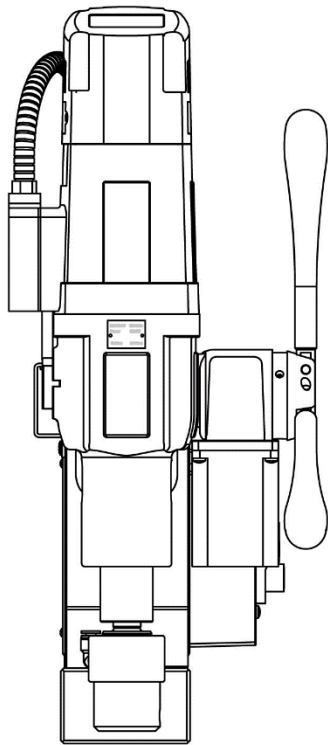
- The indicator of the potentiometer in bottom left corner is minimum speed
- The indicator of the potentiometer in bottom right corner is maximum speed

The electronic motor speed control works for both mechanical gears.

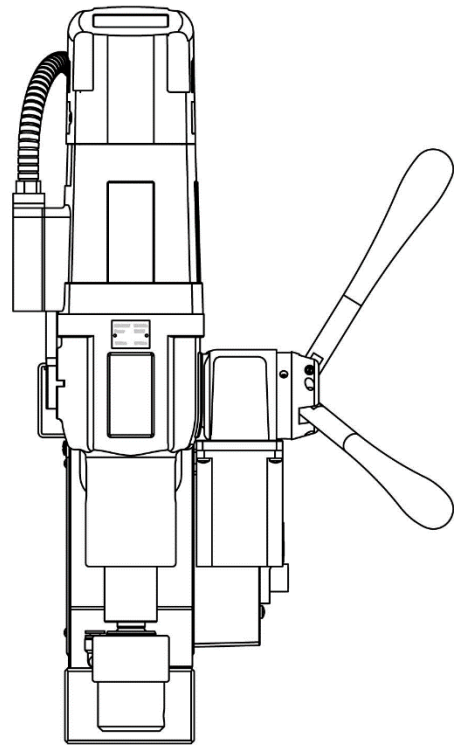
Be careful not to overturn the knob.

4.8 Automatic functionality

1. Feed handle positioning
 - a. When the feed handles are folded flat against the machine (in a 90 degree angle to the workpiece), the machine is **in manual standby position**.
In manual standby position it is possible to operate the machine for all suitable tasks (drilling with annular cutters & twist drills, countersinking, reaming and tapping) by applying manual feed pressure.
 - b. When the feed handles are folded out (in a 45 degree angle to the workpiece), the machine is in **automatic standby position**.
In automatic standby position it is possible to start the automatic feed by simply pressing the ON switch. This is possible with the motor in every height position.



Manual standby position
[image 2-7]



Automatic standby position



WARNING: Using the automatic feed function is only possible when drilling with annular cutters up to $\varnothing 55$ mm. For $\varnothing 30 - 55$ mm the use of TCT annular cutters is advised to ensure the fastest and most efficient (automatic) drilling performance.

2. Automatic drilling machines ECO.55-A and ECO.55-TA are equipped with a penetration recognition. When drilling with annular cutters in automatic mode, the magnetic drilling machine recognizes when the hole is finished. The machine will automatically return to a specified height position and shut off the motor by itself.
3. When there is not sufficient magnetic force, it is not possible to use the automatic drilling functionality. The magnet indicator will be lit red as warning.

4. During the process of drilling with annular cutters, It is possible to switch from manual to automatic mode and vice versa.



WARNING: Always check if the situation before drilling in automatic mode is safe. Stay close by to the machine and keep a close eye to the automatic drilling process to be ready to switch of the machine whenever there is need to.

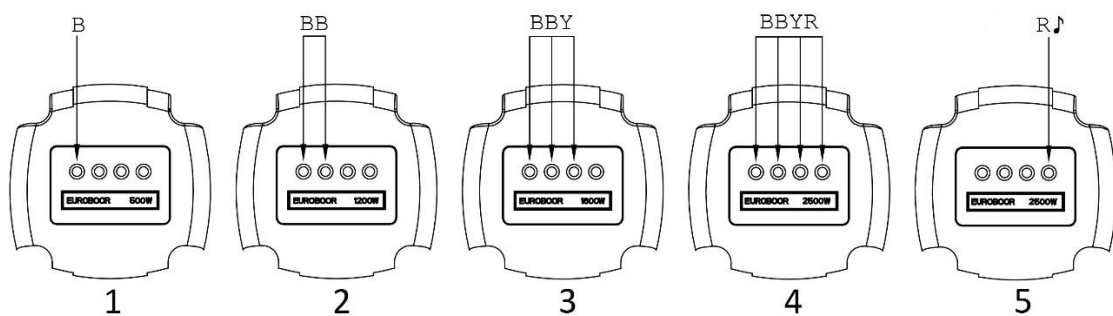
4.9 LED display & torque control

This machine is equipped with an electronic display, showing:

- Used motor power
- LED indicators

1. Switch on the electromagnet. All LED indicators shortly light up and a beep sounds
2. Switch on the motor and start drilling. When the tool first touches the workpiece the used motor power shown in the display increases, and can be increased or decreased by raising or reducing the pressure on the feed handles.

The LED indicators will help you drill at optimum load:



[image 2-8]

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
1 blue light	+ 1 blue light	+ 1 yellow light	+ 1 red light	Flashing red light + beep sound
Load	Optimum load	Acceptable overload	Close to overload	Overload limit exceeded, motor stops
Slightly increase feed pressure when possible	Maintain feed pressure	Slightly reduce feed pressure when possible	Reduce feed pressure	Reduce feed pressure

When the motor is in overload (phase 5), the Smart Restart torque control technology ensures trouble-free continuation of your drilling job. When the feed pressure is reduced, the machines electronics recognize the reduction and the motor continues within a few seconds.



WARNING: The displayed motor power usage and LED indicators are only an indication of correct cutting performance. Always keep an eye on the workpiece, tool and machine and check if the cutting performance is as it should be, especially when drilling in automatic mode.



WARNING: Never touch any potentially moving parts as long as the motor switch is still switched on!

4.10 Temperature control

The ECO.55-(T)A is equipped with an all-time electronic temperature protection. If the temperature of the motor unit runs up to 70 Degree Celsius 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.

4.11 Tool lubrication

IN HORIZONTAL APPLICATIONS

In order to use the lubrication system, the tank must be filled with a cutting fluid or oil

1. Make sure the flow regulator is closed
 2. Unscrew the cap
 3. Fill the container with cutting fluid or oil
 4. Screw the cap back on
- Adjust the fluid flow as required using the flow regulator;
 - Add more cutting fluid if 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 Euroboor cutting paste*

Make sure to use only suitable cutting oil or fluid. Euroboor offers a wide range of cutting lubricants for all tool and material combinations. Proper cooling will help you create better and faster results, and extend the lifetime of your tools.

5 Working with operating tools

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 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.

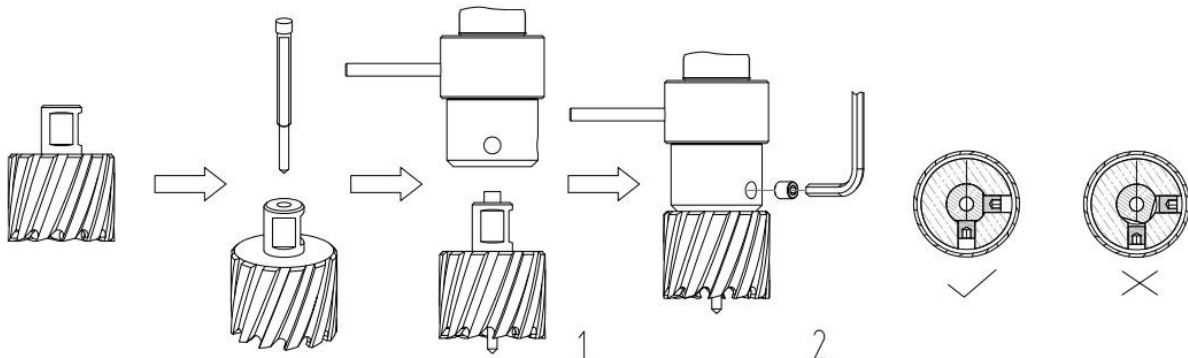
The drilling conditions are dependent on requirements for tool life and surface finish. These conditions are further restricted by the rigidity of the tool and the work piece, lubrication and machine power available. The harder the material, the lower the cutting speed.

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 explanatory 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 (1)
 - Tighten the screws (2)



[image 3-1]

2. Precisely mark the centre of the hole

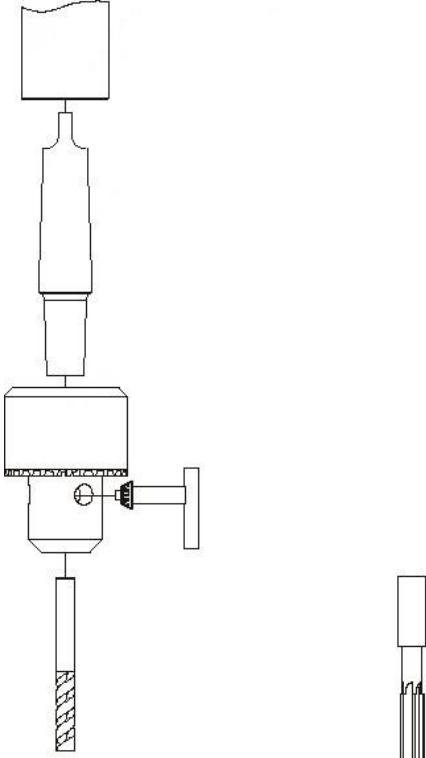
3. Use the pilot pin to position the machine and in the correct position, with the tip of the pilot pin to meet the marked center of the hole.
4. Switch on the magnet and verify that the drill is in the right position and that the machine is pushed tight against the work piece.
5. If your machine is equipped with a auto coolant system, put open the valve to release the oil. If your machine does not have an auto coolant system, fill the holes of the spindle with oil.
6. Switch the motor on at and allow it to run at the required speed. *
7. Turn the arms to start drilling. Apply only a slight pressure when the annular cutter touch 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 tool. 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. Adjust the oil supply when necessary, if your drill does not have an auto coolant system, 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 arms 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 metal piece drilled out can be sharp and very hot!!

* When drilling in automatic mode, steps 6 – 11 are taken care of automatically by the magnetic drilling machine itself. Always check if the situation before drilling in automatic mode is safe. Keep a close eye to the automatic drilling process and be ready to switch of the machine whenever there is need to.

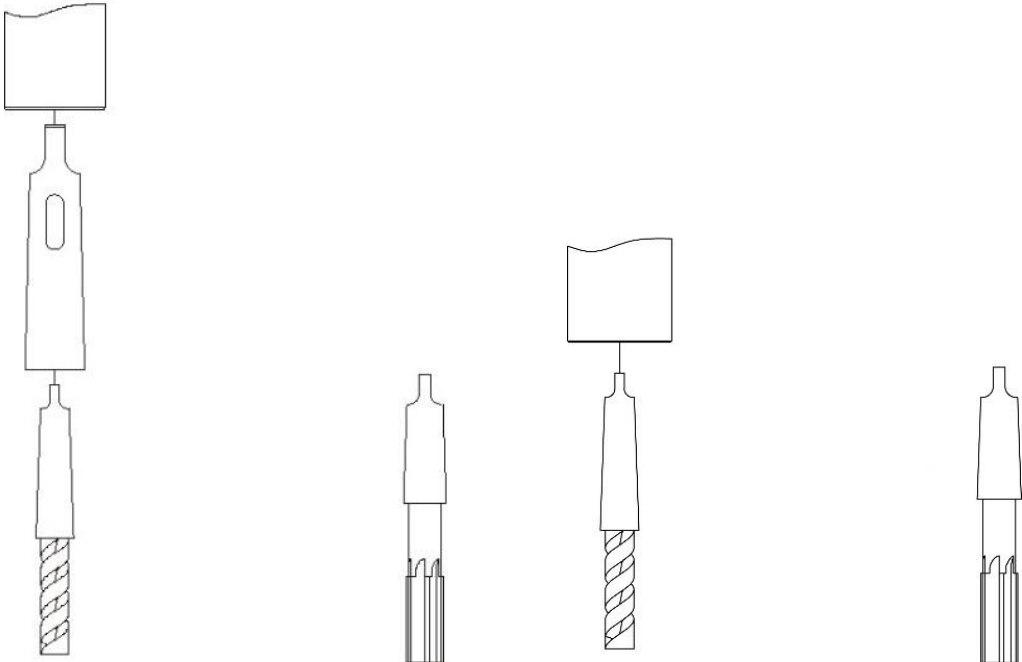
5.2 Twist drills

- 1. Remove the Morse Taper arbor (see chapter Gearbox)
- 2. Fit the twist drill
 - a. Straight shank twist drills



[image 3-2]

- b. Morse Taper shank twist drills



[image 3-3] Morse Taper 2

[image 3-4] Morse Taper 3

3. Precisely mark the center of the hole, and use the tip of the twist drill to position the machine and in the correct position, with the tip of the twist drill to meet the marked center of the hole.

Steps 4-12: see chapter Annular cutters. Make sure the machine runs at maximum speed for twist drills!



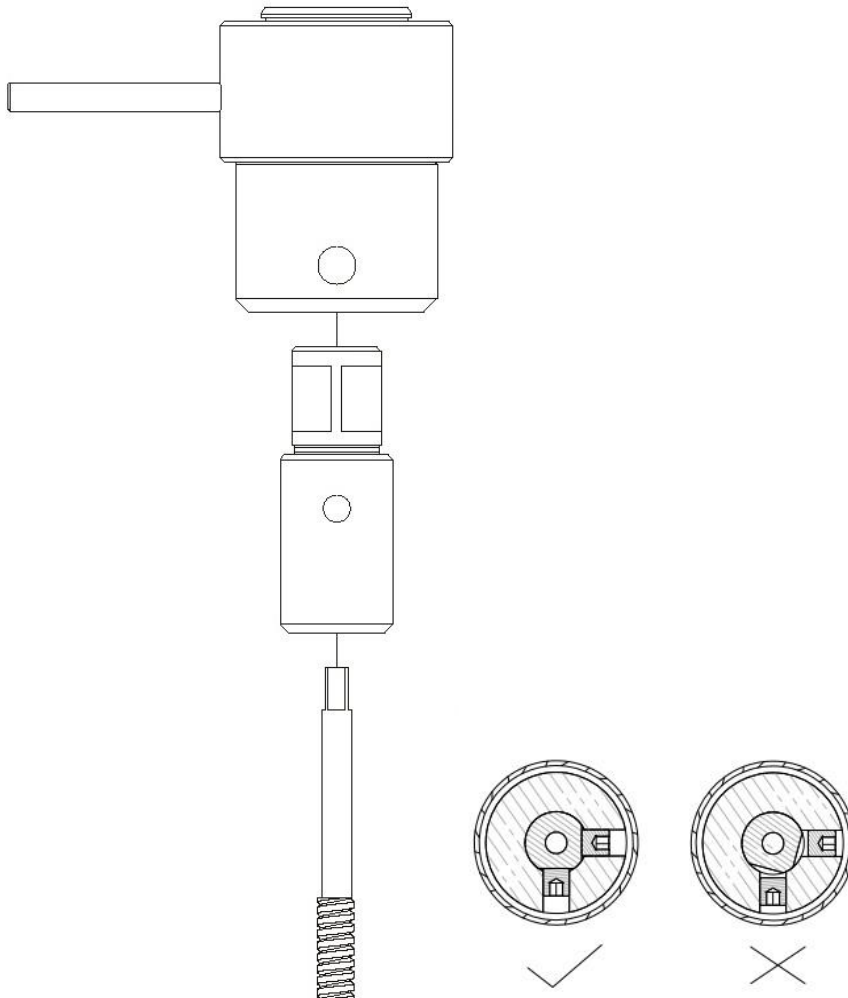
WARNING: Do not use the automatic feed mode when drilling with twist drills. Manual feed only!

5.3 Machine taps

ECO.55-TA only

The ECO.55-TA model is equipped with a reversible direction of rotation and can also be used for cutting threads. Proceed as follows for cutting threads:

1. Install the tap



[image 3-5]

2. Drill the hole for the thread on the recommended size of the tap
3. Switch off the machine and change the cutter for the tap collet and the machine tap. **DO NOT MOVE THE MACHINE**

4. Select the lowest gear and lowest speed and set the direction of rotation to clockwise (right = R)
5. Switch on the machine and set the machine tap onto the drilled hole
6. Guide the machine slide down at the handle without exerting
7. Switch off the machine (just before the tap is completely through the hole) and set the direction of rotation to anti-clockwise (left = L) at switch

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 at handles to avoid damaging the start of the thread. **DO NOT LET YOUR TAP PUSH UP THE MOTOR UNIT BY ITSELF!!**

Make sure the properly lubricate while performing tapping work, see chapter Annular cutters



WARNING: Do not use the automatic feed mode when using machine taps. Manual feed only!

5.4 Countersinks

Thanks to its wide range of operating speeds, the machine can also be used for reaming or counter-sinking.

Follow the steps mention in chapter Twist drills



WARNING: Do not use the automatic feed mode when using countersinks. Manual feed only!

6. Maintenance

Your EUROBOOR power tool has been 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 magnetic drilling machine with moving parts, your Euroboor magnetic drilling machine also needs regular maintenance service. 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.

CARBON BRUSHES

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

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 is 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 OIL

The gearbox oil should be checked and replaced at least once a year to ensure maximum lubrication and cooling, and thus the best performance of the machine.

CHECK ARMATURE

This should be checked at least 1 per 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 5 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.

MAINTENANCE OF AUTOMATIC FEED ARM MECHANISM

For the maintenance of the automatic feed arm mechanism we refer to a specialized workshop.

REPAIR, MODIFICATION AND INSPECTION

Repair, modification and inspection of Euroboor Magnetic drilling machines must be done by EUROBOOR or an EUROBOOR authorized dealer. The spare parts list will be helpful if presented with the machine to the Euroboor dealer for service when requesting repair or other maintenance.

Euroboor 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 Euroboor's continuing program of research and development, the specifications of machines are subject to change without prior notice.



WARNING: *Since accessories, other than those offered by EUROBOOR, have not been tested with this product, use of such accessories with this tool could be hazardous. To reduce the risk of injury, only EUROBOOR recommended accessories should be used with this product.*

Consult your dealer for further information on the appropriate accessories.

7. Trouble shooting

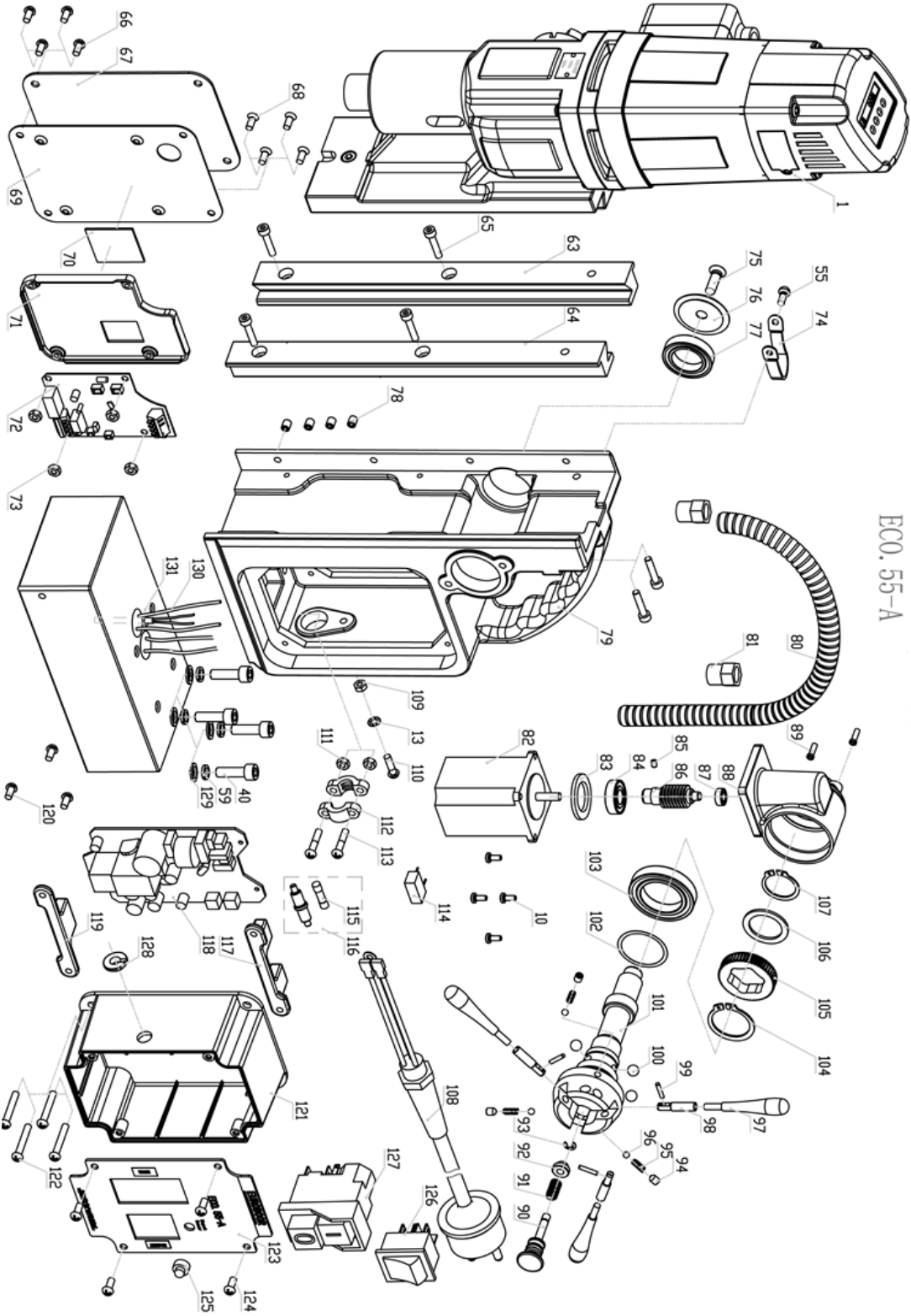
Magnet and motor do not function	<ul style="list-style-type: none"> - The magnet switch is not connected to the power supply - Damaged or defective wiring - Defective fuse - Defective magnet switch - Defective Control Unit - Defective power supply
Magnet does function, the motor does not work	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Defective magnet - Defective wiring of magnet - Defective Control Unit
Automatic feed function does not work	<ul style="list-style-type: none"> - Insufficient magnetic force - Feed handle mechanism needs adjustment - Carbon brushes are stuck or worn out - Defective Control Unit - Defective motor unit
Annular cutters break quickly, holes are bigger than the hole cutter	<ul style="list-style-type: none"> - Clearance in the guide - Bent spindle - Shaft extending from the motor is bent - Bent pilot pin
Motor running roughly and/or seizing up	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Damage or defective relays in control unit
Motor making a rattling sound	<ul style="list-style-type: none"> - Gear ring (bottom of the armature) worn out - Gear(s) worn out - No grease in gear box
Motor humming, big sparks and motor has no force	<ul style="list-style-type: none"> - Armature damaged (burned) - Field burned - Carbon brushes worn out
Motor does not start or fails.	<ul style="list-style-type: none"> - Damaged or defective wiring - Dirt in sensor Speed Control Unit - Defective or loose magnet on top of armature - Damaged or defective (sensor) Speed Control Unit - Damage to Armature or field coil - Damaged or defective carbon brushes
Guiding takes a great deal of effort	<ul style="list-style-type: none"> - Guide is set too tight - Guide is dry, needs to be greased - Guide/gear- rack/rotation system dirty or damaged

Insufficient magnetic force	<ul style="list-style-type: none"> - Damaged or defective wiring - Bottom of magnet not clean and dry - Bottom of magnet not flat - Work piece is not bare metal - Work piece is not clean or flat - Work piece is less than 10 mm (too thin) - Defective Control Unit - Defective magnet
Frame under voltage	<ul style="list-style-type: none"> - Damaged / defective wiring - Defective magnet - Motor seriously dirty
Fuse blows when magnet switch is turned on	<ul style="list-style-type: none"> - Damaged or defective wiring - Wrong value fuse - Defective magnet switch - Defective Control Unit - Defective magnet
Fuse blows when motor is started	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - Loose or defective gear-rack - Defective rotation system
Red blinking light in top display with buzzer sound	Machine is in overload protection
Red burning light in top display with buzzer sound	Machine is in overheat protection

8. Exploded view & spare part list

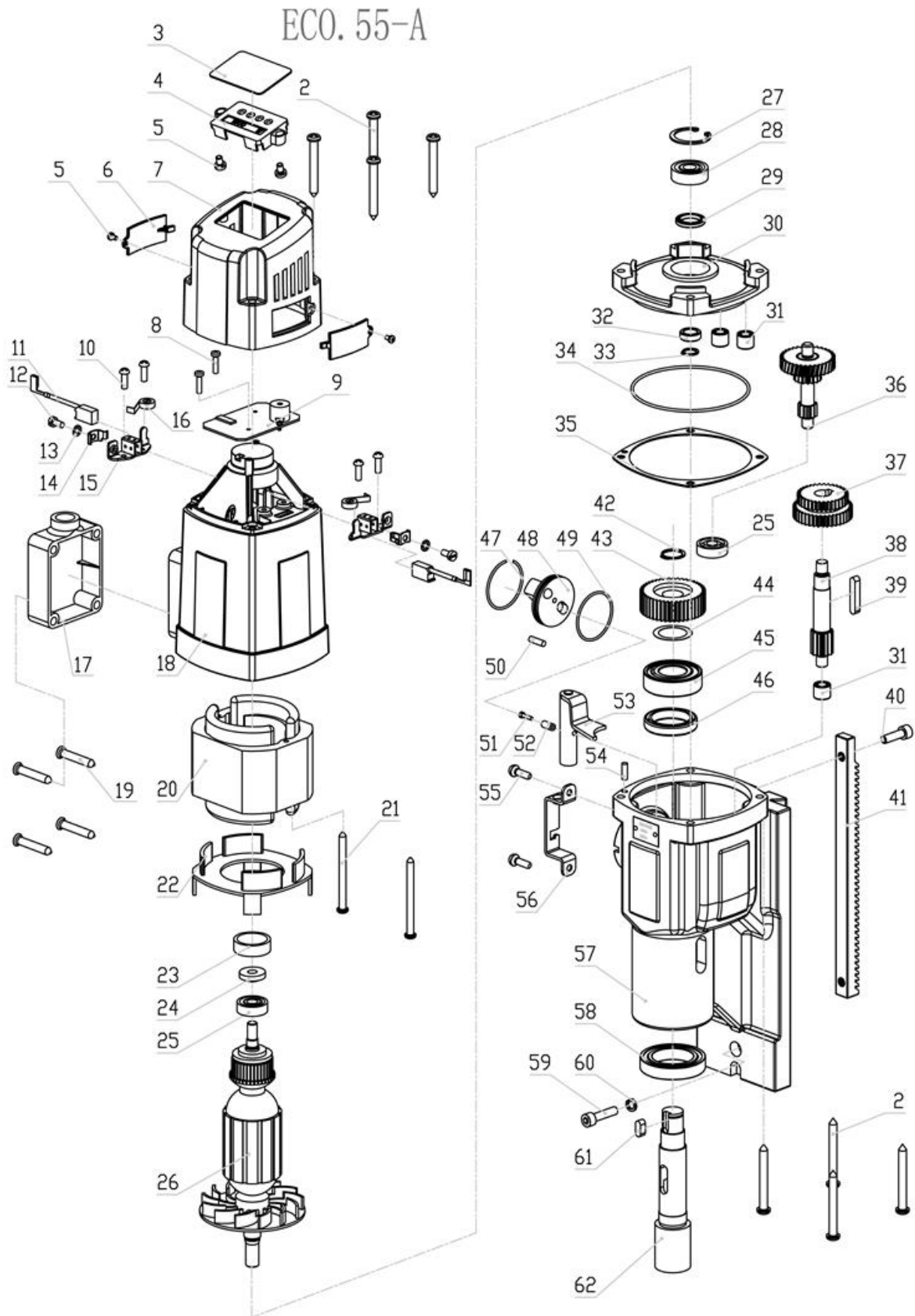
8.1 Exploded views

ECO.55-A

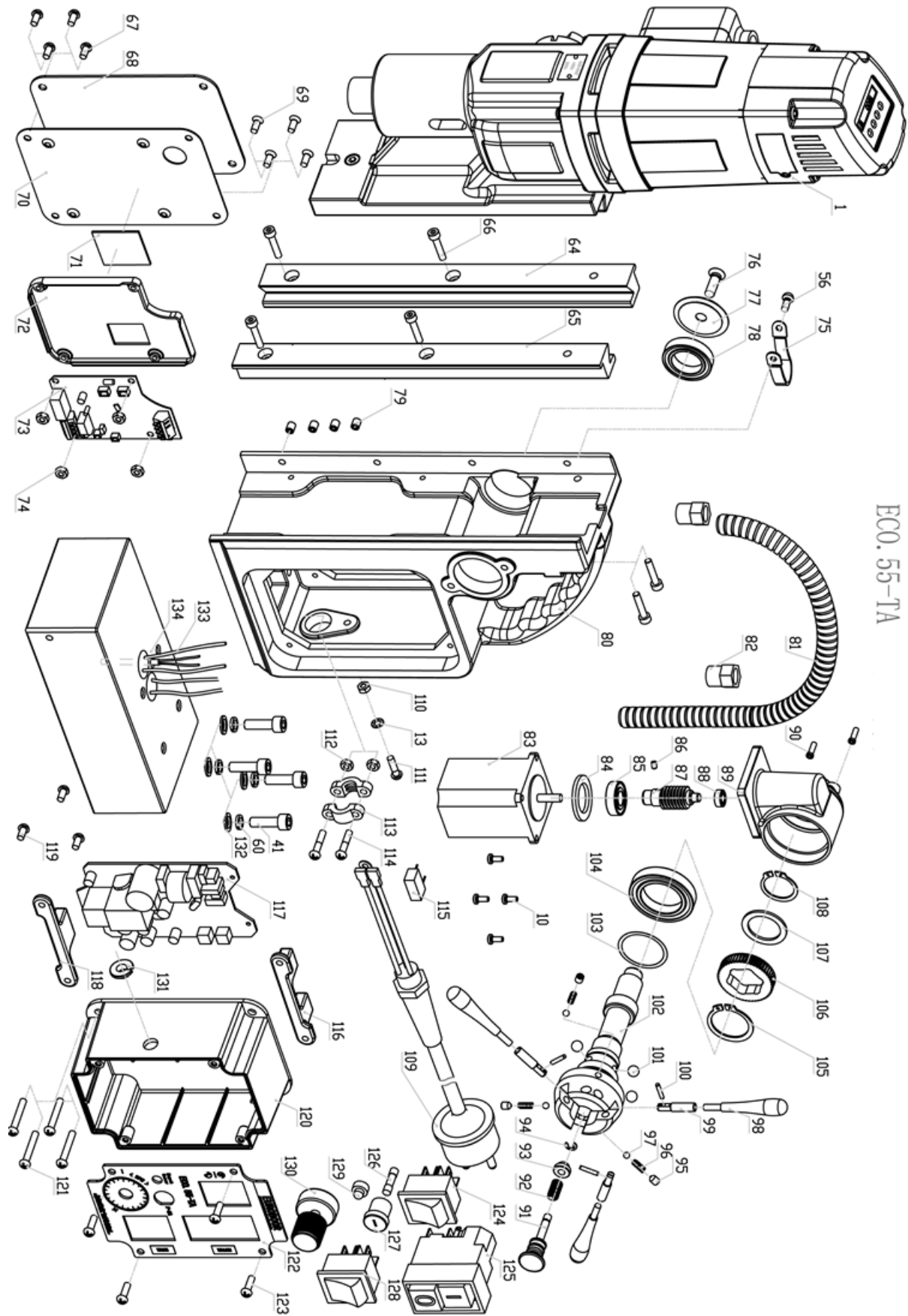


ECO.55-A

ECO.55-A CONTINUED

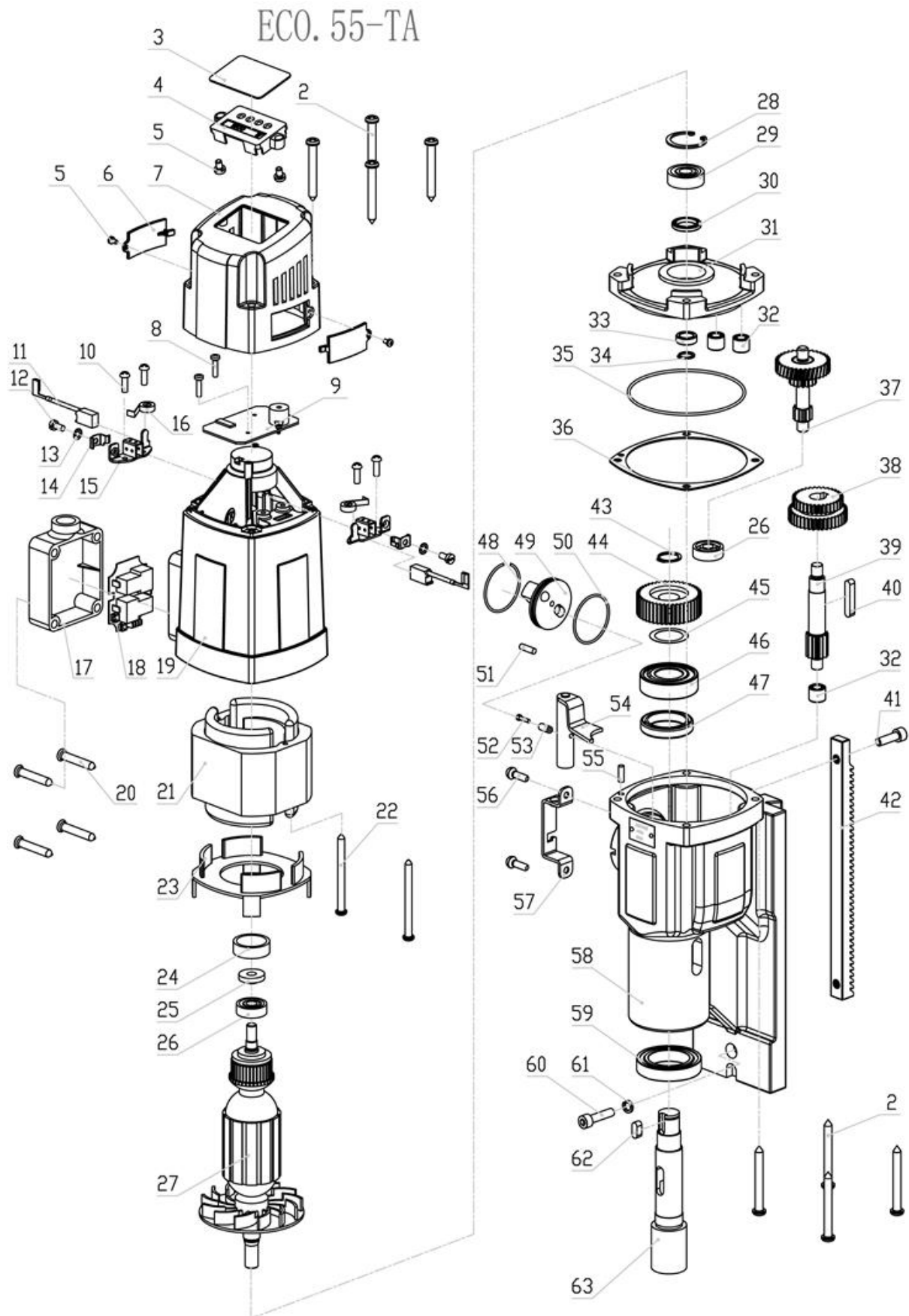


ECO.55-TA



ECO.55-1A

ECO.55-TA CONTINUED



8.2 Spare part lists

ECO.55-A

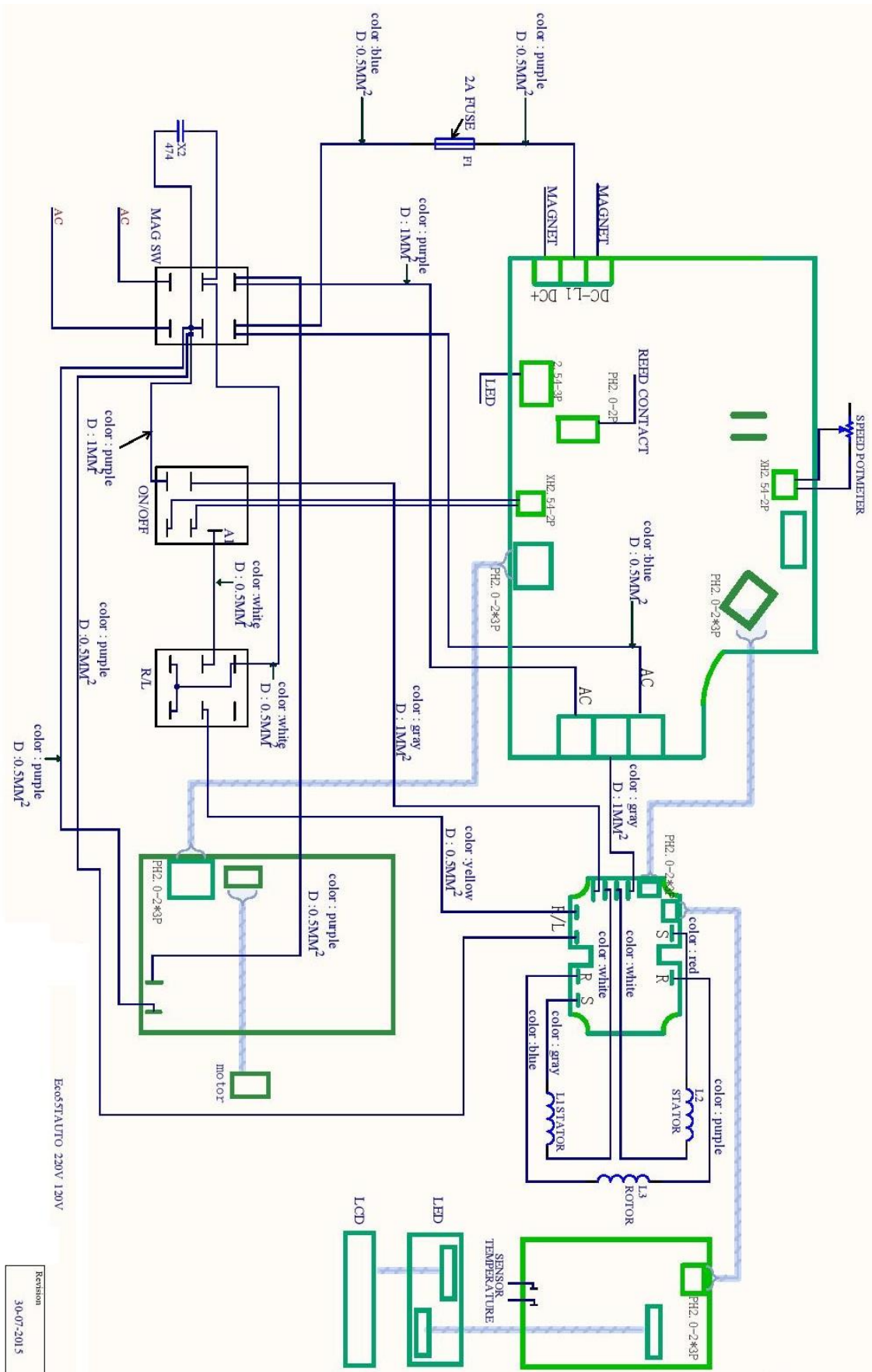
No.	Part number	Description	Qty
1	055.1001	Motor unit 220-240 V	1
	055.1001A	Motor unit 110-120 V	
2	050.0106	Screw M5x45	8
3	050.0059	Protective cover 53 x 35	1
4	050.1013	Led screen	1
5	050.0060	Screw M3 x 5	4
6	050.0133	End plate	2
7	050.0130	End cover	1
8	050T.0332	Screw for sp.cntn. unit	2
9	055.0552	ECO.55-A Control unit 2 - 230V	1
	055.0552A	ECO.55-A Control unit 2 - 110V	
10	050.0069	Carbon brush set 230V	1
	050.0070	Carbon brush set 110V	
12-16	050.0371	Carbon brush holder	2
17	050.0586	Cable housing	1
18	050.0131	Housing	1
19	050.0587	Screw pkvz 4,8 x 35	4
20	050T.0278	Field 230V	1
	050T.0278A	Field 110V	
21	020.0328	Screw M4 x 70	2
22	050.0261	Baffle	1
23	050T.0346	Rubber ring	1
24	050T.0180	Armature speed disk	1
25	032.0126	Bearing 8x22x7 608	2
26	050T.0183	Armature	1
	050T.0183A	Armature 110V	
27	032.0166	Circlip 472/28/1.2	1
28	032.0171	Bearing 6001 12 x 28 x 8	1
29	050.0064	Oil bearing 15 x 21 x 3	1
30	050.0236/Y	Inner gear plate	1
31	040.0161	Needle bearing HK 0810	3
32	050.0065	Metal ring	1
33	050.0176	Circlip 471/11	1
34	050.0071	O-ring 82 x 1.8	1
35	050.0207	Gasket middle	1
36A	050.0251	First gear	1
36B	050.0246	Gear shaft	1
37	050.0171	Gear 34/40Z	1
38	050.0231	Axle	1
39	100.4496	Key 5x5x28	1
40	020.0156	Screw SSM6x20	5
41	050.0074	Rack 1.5 x 39T	1
42	050.0076	Circlip diam. 20	1
43	050.0463	Gear 1 x 45T	1
44	050.0462	Washer 20.5 x 28 x 0.2	1
45	030.0009	Bearing 6004DDU	1
46	050.0066	Oil bearing 28 x 38 x 7	1
47	050.0078	Ring 41.5 x 36.5 x 1.5	1
48	050.1014	Gear Switch	1
49	050.0081	O-ring	1
50	050.0025	Pin	1
51	020.0329	Screw M4 x 16	1
52	050.0082	Screw holder	1
53	050.1005A	Clutch shaft	1
54	032.0211	Casing pin 4 x 12	1
55	020.0063	Screw M5x20	3
56	KSP.M/3	Coolant hanger	1
57	050.1015	Gear box 230V	1
57	050.1019	Gear box 110V	1
	050.0068	Bearing 61906DDU	
59	020.0146	Screw M6 x 25	1
60	020.0111	Washer M6 DIN7980	5

No.	Part number	Description	Qty
61	050.0077	Key 6 x 6 x 12	1
62	050.0461	Spindle drive shaft 34x146	1
63	020.0086/Z	Rail set Aluminium (L+R)	1
64			
65	020.0063	Screw M5x20	6
66	020.0101	Panel Screw BKVZM4x8	4
67	055.0002	Rear panel plate 230V	1
	055.0002A	Rear panel plate 110V	
68-73	055.1012	Speed control unit 220V	1
	055.1012A	Speed control unit 110V	
74	020.0298	Motor cable clamp	1
75	020.0081	End Screw BKVZM6x20	1
76	020.0077	End plate	1
77	050.0063	Bearing	1
78	020.0516	Screw SS M5 x 10	4
79	055.0006X	Frame	1
80	020.0046	Motor cable	1
81	020.0041	Coupling nut (motor cable)	2
82	050.0056	Step motor	1
83	050.0028	Washer $\Phi 25 \times \Phi 37 \times 3.0$	1
84	040.0086	Bearing 6001DDU	1
85	055.0016	Screw M4x5	1
86	050.0042	Worm 1x0.9	1
87	055.0008	Bearing 628/7-ZZ	1
88	050.0033X	Gear box plate	1
89	020.0229	Screw M4x20	2
90-100	055.1003	Capstan hub assembly auto-feed	1
98	055.0020	Drilling rocker arm	3
101	030.0030X	Arm for capstan	3
102	050.0027	Washer $\Phi 36 \times \Phi 42 \times 0.2$	1
103	055.0017	Bearing 61907	1
104	050.0044	Circlip $\Phi 35$	1
105	050.0041	Turbine - 50x0.9	1
106	050.0029	Washer - $\Phi 28.5 \times \Phi 38 \times 2.0$	1
107	050.0045	Circlip $\Phi 28$	1
108	020.0031	Coupling nut (Main cable)	1
108A	020.0036	Main cable complete 220V	1
109-110	020.0036/AU	Main cable Australia	1
	020.0036/UK	Main cable UK 220v	
	020.0036/UK 110-16A	Main cable UK 110v 16A	
	020.0036/USA	Main cable USA	
	020.0182	Grounding Screw set	1
111-113	020.0037	Cable clamp	1
114	020.0257	Capacitance	1
115	020.0017	Fuse 5x20 F2A	1
116	020.1001	Fuse holder 5x20	1
117	055.0018	PCB box-2	1
118	055.0007	DRIVE BOARD	1
119	055.0019	PCB box-1	1
120	032T.0019XA	Screw M3X8	3
121	050.0048	Panel washer	1
122	020.0183	Screw	4
123	055.0049	Front panel plate	1
124	055.0022	Screw M4x12	4
125	020.0206	LED indicator set	1
126	020.0011	Magnet Switch	1
127	030E.0091/Y	Motor switch (5-pin) 230V	1
127	030E.0092/Y	Motor switch (5-pin) 110V	1
128	055.0024	Washer	1
129	020.0111	Washer M6 DIN7980	4
130	020.0201/2	Sensor	1
131	050.1003	Magnet	1

ECO.55-TA

No.	Part number	Description	Qty
1	055T.1001	Motor unit 220-240 V	1
	055T.1001A	Motor unit 110-120 V	
2	050.0106	Screw 4,8xx45	8
3	050.0059	Protective cover 53 x 35	1
4	050.1013	Led screen	1
5	050.0060	Screw M3 x 5	4
6	050.0133	End plate	2
7	050.0130	End cover	1
8	050T.0332	Screw for sp.cnt. unit	2
9	055T.0011	ECO.55-TA Control unit 2 - 230V	1
	055T.0011A	ECO.55-TA Control unit 2 - 110V	
10	050.0069	Carbon brush set 230V	1
	050.0070	Carbon brush set 110V	
11-16	050.0371	Carbon brush holder	1
17	050.0586	Cable housing	1
18	050T.0002	Control Unit 1 230V	1
	050T.0003	Control Unit 1 110V	
19	050.0131	Housing	1
20	050.0587	Screw pkvz 4,8 x 35	4
21	050T.0278	Field 230V	1
	050T.0278A	Field 110V	
22	020.0328	Screw M4 x 70	2
23	050.0261	Baffle	1
24	050T.0346	Rubber ring	1
25	050T.0180	Armature speed disk	1
26	032.0126	Bearing 8x22x7 608	1
27	050T.0183	Armature 230V	1
	050T.0183A	Armature 110V	
28	032.0166	Circlip 472/28/1.2	1
29	032.0171	Bearing 6001 12 x 28 x 8	1
30	050.0064	Oil bearing 15 x 21 x 3	1
31	050.0236/Y	Inner gear plate	1
32	040.0161	Needle bearing HK 0810	3
33	050.0065	Metal ring diam. 40	1
34	050.0176	Circlip 471/11	1
35	050.0071	O-ring 82 x 1.8	1
36	050.0207	Gasket middle	1
37A	050.0251	First gear	1
37B	050.0246	Gear shaft	1
38	050.0171	Gear 34/40Z	1
39	050.0231	Axle 13T	1
40	100.4496	Key 5x5x28	1
41	020.0156	Screw SSM6x20	5
42	050.0074	Rack - 1.5X39T	1
43	050.0076	Circlip diam. 20	1
44	050.0463	Gear 1 x 45T	1
45	050.0462	Washer 20.5 x 28 x 0.2	1
46	030.0009	Bearing 6004DDU	1
47	050.0066	Oil bearing 28 x 38 x 7	1
48	050.0078	Ring 41.5 x 36.5 x 1.5	1
49	050.1014	Gear Switch	1
50	050.0081	O-ring	1
51	050.0025	Pin	1
52	020.0329	Screw M4 x 16	1
53	050.0082	Screw holder	1
54	050.1005A	Clutch shaft	1
55	032.0211	Casing pin 4 x 12	1
56	020.0063	Screw M5x20	2
57	KSP.M/3	Coolant hanger	1
58	050.1015	Gear box 230V	1
58	050.1019	Gear box 110V	1
59	050.0068	Bearing 61906DDU	1
60	020.0146	Screw M6 x 25	1
61	020.0111	Washer M6 DIN7980	5

No.	Part number	Description	Qty
62	050.0077	Key 6 x 6 x 12	1
63	050.0461	Spindle drive shaft 34x146	1
64	020.0086/Z	Rail set Aluminium (L+R)	1
65			
66	020.0063	Screw M5x20	6
67	020.0101	Panel Screw BKVZM4x8	4
68	055.0002	Rear panel plate 230V	1
	055.0002A	Rear panel plate 110V	
69-74	055T.1012	Speed control unit 220V	1
	055T.1012A	Speed control unit 110V	
75	020.0298	Motor cable clamp	1
76	020.0081	End Screw BKVZM6x20	1
77	020.0077	End plate	1
78	050.0063	Bearing	1
79	020.0516	Screw SS M5 x 10	4
80	055.0006X	Frame	1
81	020.0046	Motor cable	1
82	020.0041	Coupling nut (motor cable)	2
83	050.0056	Step motor	1
84	050.0028	Washer $\Phi 25 \times \Phi 37 \times 3.0$	1
85	040.0086	Bearing 6001DDU	1
86	055.0016	Screw M4x5	1
87	050.0042	Worm 1x0.9	1
88	055.0008	Bearing 628/7-ZZ	1
89	050.0033X	Gear box plate	1
90	020.0229	Screw M4x20	2
91-101	055.1003	Capstan hub assembly auto-feed	1
102	030.0030X	Arm for capstan	3
103	050.0027	Washer $\Phi 36 \times \Phi 42 \times 0.2$	1
104	055.0017	Bearing 61907	1
105	050.0044	Circlip $\Phi 35$	1
106	050.0041	Turbine - 50x0.9	1
107	050.0029	Washer - $\Phi 28.5 \times \Phi 38 \times 2.0$	1
108	050.0045	Circlip $\Phi 28$	1
109A	020.0031	Coupling nut (Main cable)	1
109B	020.0036	Main cable complete 220V	1
110-111	020.0036/AU	Main cable Australia	1
110-111 112-114	020.0036/UK	Main cable UK 220v	1
	020.0036/UK 110-16A	Main cable UK 110v 16A	
	020.0036/USA	Main cable USA	
	020.0182	Grounding Screw set	
	020.0037	Cable clamp	
115	020.0257	Capacitance	1
116	055.0018	PCB box-2	1
117	055.0007	Drive Board	1
118	055.0019	PCB box-1	1
119	032T.0019XA	Screw M3X8	3
120	050.0048	Panel washer	1
121	020.0183	Screw	4
122	055T.0049	Front panel plate	1
123	055.0022	Screw M4x12	4
124	100.0152	R/L Switch (push) 1800 W	1
125	030E.0091/Y	Motor switch (5-pin) 230V	1
125	030E.0092/Y	Motor switch (5-pin) 110V	1
126	020.0017	Fuse 5x20 F2A	1
127	020.0016	Fuse holder	1
128	020.0011	Magnet switch	1
129	020.0206	LED indicator set	1
130	050T.1009	Potentiometer (turn)Knob	1
131	055.0024	Washer	1
132	020.0111	Washer M6 DIN7980	4
133	020.0201/2	Sensor	1
134	050.1003	Magnet	1



Revision
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