

# Mag Drill

## EM16

# EDX

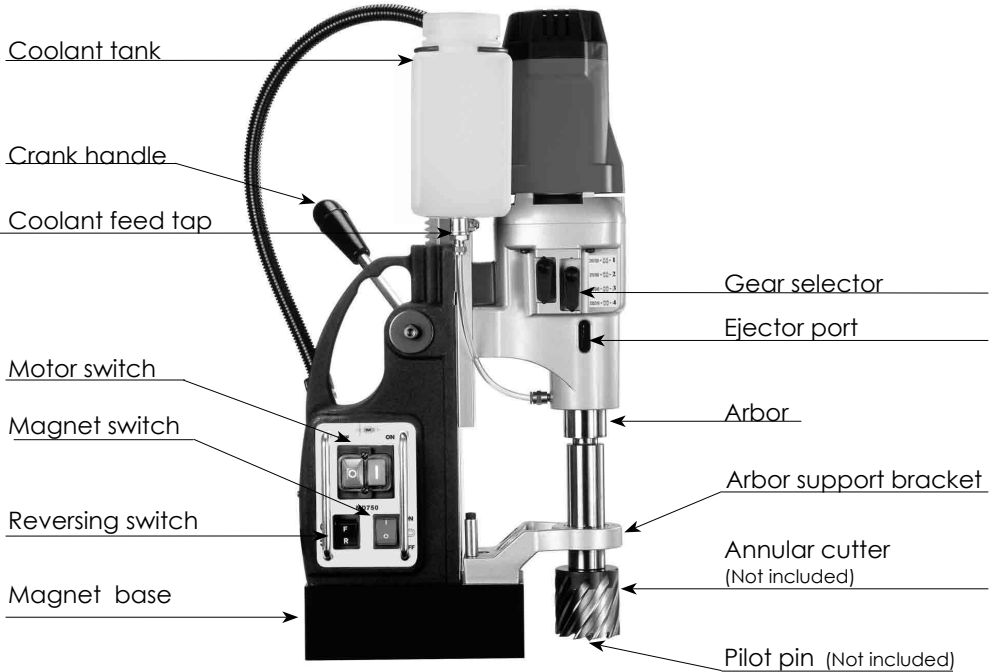
power for finishing



SAVE THESE INSTRUCTIONS  
FOR FUTURE REFERENCE.

# EM16

# 4 Speed Drilling System



MT3 Tapping adaptor and Tapping unit (Not included)



MT3 Twist drill bit (Not included)



MT3 Chuck adaptor and Chuck (Not included)

POWER INPUT		1800 W
NO/FULL LOAD RPM	SPEED 1	150 / 90 MIN
	SPEED 2	200 / 120 MIN
	SPEED 3	300 / 180 MIN
	SPEED 4	380 / 230 MIN
CAPACITY:	DIAMETER BY DEPTH OF CUT ( HAND FEED)	75MM X 50MM
	DIA. X DEPTH OF MT3 TWIST DRILL BIT	32MM X 150 M
	DIA. X DEPTH OF MT3 CHUCK ADAPTOR WITH TWIST DRILL BIT	16MM X 110MM
DIA. X DEPTH OF TAPS		25.4MM X 40MM
MAGNETIC ADHESION		32,000N
N. / WEIGHT		24.8 kg ( 54.56 lbs)

### STANDARD ACCESSORIES

WRENCH M8  
 HEX. KEY M2.5  
 HEX. KEY M4  
 CHIP GUARD KIT  
 COOLANT TANK KIT  
 SAFETY CHAIN  
 DRIFFT

### OPTIONAL ACCESSORY

MT3 CHUCK ADAPTOR  
 16MM CHUCK & KEY  
 MT3 TAPPING ADAPTOR  
 TAPPING ATTACHMENT

# **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

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**WARNING! Read and understand all instruction before operating any drilling system.** Failure to follow all instructions listed below may result in electrical shock, damage to drilling system and even personal injury.

## **GENERAL SAFETY INSTRUCTIONS**

### **Work area**

**Keep your working area clean and well lighted.** Cluttered benches and working stations causes accidents as well as dark spaces. Always ensure working stations are clean and well lit.

**Do not operate power tools in explosive atmosphere, such as in the presence of flammable liquids, gases or extreme dust.** Power tools create sparks that may ignite gases as well as flammable liquids. Dust may enter the ventilation system causing clogging and causing overheating.

**Keep bystanders, children and visitors away from moving parts of the power tool.** Any distractions can cause you to loose control of the power tool and an injury could take place.

### **Electrical Safety**

**Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the ground prong or modify the dance plug in any way. Do not use any adaptor plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.** If tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.

**Never carry a tool by the cord or hose and “yanking” the cord or the hose to disconnect it from the receptacle.** Always carry the power tools properly and store in dry and dust free place.

**Keep cords and hoses away from heat, oil and sharp edges.** Damaged cords increase the risk of electric shock.

**Don't expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.

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**When operating a power tool outside, use an outdoor extension cord marked .W-A. or. W..** These cords are rated for outdoor use and reduce the risk of electric shock.

## **Personal Safety**

**Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use tool while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.

**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.

**Avoid accidental starting. Be sure switch is off before plugging in.** Carrying tools with your finger on the switch or plugging in tools that have the switch on invites accidents.

**Remove adjusting keys or switches before turning the tool on.** A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.

**Do not overreach. Keep a proper footing and balance at all times.** Proper footing and balance enables better control of the tool in unexpected situations.

**Use safety equipment. Always wear eye protection.** Dust mask, non-skid safety shoes, hardhat, or hearing protection must be used for appropriate conditions.

## **Tool use and care**

**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.

**Do not force tool. Use the correct tool for your application.** The correct tool will do the job better and safer at the rate for which it is designed.

**Do not use tool if switch does not turn it on or off.** Any tool that cannot be controlled with the switch is dangerous and must be repaired.

**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.

## **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

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**Store idle ling tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.

**Maintain tools 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.

**Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tools operation.** If damaged, have the tool serviced before using. Poorly maintained tools cause many accidents.

**Use only accessories that are recommended by the manufacturer for your model.**

Accessories that may be suitable for one tool may become hazardous when used on another tool.

### **Service**

**Only qualified repair personnel must perform tool service.** Service or maintenance performed by unqualified personnel could result in a risk of injury.



**When servicing 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.

# PORTABLE MAGNETIC CORE DRILLING SYSTEM

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## Symbols used in this manual

**IMPORTANT:** Some of the following symbols may be used on your tool. Please study them and learn their meaning. Proper interpretation of these symbols will allow you to operate the tool better and safer.

Symbol	Name	Designation/Explanation
V	Volt	Voltage (potential)
A	Amperes	Current
Hz	Hertz	Frequency (cycles per second)
W	Watt	Power
kg	Kilograms	Weight
min	Minutes	Time
s	Seconds	Time
φ	Diameter	Size of drill bits
No	No load speed	Rotational speed, at no load
.../min	Revolutions per minute	Revolutions, strokes, surface speed per minute.
0	Off position	Zero speed, zero torque...
1, 2, 3, ...	Selector settings	Speed setting, higher number means greater speed
~	Alternating current	Type or a characteristic or current
	Class II construction	Double Insulated, construction tool
	Warning symbol	Alerts user to warning messages

## Terminology used in the manual

- 1. Warning:** This term means that there is a risk of physical harm or death to the operator or people nearby.
- 2. Caution:** This term means that there is a risk of damage to the machine, cutting tool or other equipment.
- 3. Note:** These terms offer useful information relating to the operation of the machine or its maintenance.

# **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

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## **SPECIFIC SAFETY RULES AND REGULATIONS**

**Always use safety chain.** Mounting can release.

**The magnet's adhesion depends on the thickness of the work piece.** Always ensure that the work piece is a minimum of 12mm (7/16 in.) thick. If it is not, then use a piece of steel plate at least 12mm thick and larger than the magnet below the work piece to supplement the magnetic adhesion.

**Metal chips and other debris will seriously hamper magnetic adhesion.** Always ensure that the magnet is clean.

**Other units used on the same receptacle will cause uneven voltage that could lead to the magnet releasing.** Always use the tool alone on the receptacle.

**It is hazardous to use the drill upside-down.** Do not exceed 90 degrees from horizontal.

**Avoid the magnet releasing.** Ensure that the magnet has properly adhered to the work piece before beginning drilling.

**Avoid operating annular cutters without coolant fluid.** Always check coolant level before operating.

**Do not operate with dull or damaged cutting tools.** This may overload the motor.

**Protect the motor.** Never allow cutting fluid, water, or other contaminants enter the motor.

**Metal chips are often very sharp and hot.** Never touch them with bare hands. Clean up with a magnetic chip collector and a chip hook or other appropriate tool.

**CAUTION: NEVER position machine on a work piece between the electrode and the ground of any arc type welder. Damage to the machine will result, as the welder will ground through the machine's ground cable.**

**WARNING: NEVER attempt to use machine with incorrect current or abnormally low voltage. Check machine nameplate to ensure that correct voltage and Hz are used.**

# **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

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## **ASSEMBLY**

**Coolant tank assembly required.** First attach clear tube to the bottom of the coolant tank. To do this, first loosen the nut and slide nut onto the tube. Then slide tube onto the nipple. Then tighten the nut. Slide tank hanger over the screw on the upper right hand side of slide and tighten. Finally insert the other end of the tube into the quick-release connector in the gearbox. Just directly push in to install. **(To remove, first firmly push the red collar of the connector and pull the tube out.)** Cutting coolant fluid is always required when using annular cutters. Open tank cover and fill. Check coolant fluid level often. Keep coolant tap closed when not in use.

**Chip guard must be used.** To attach the chip guard, use the supplied butterfly bolts to bolt to the magnet. It is not necessary to remove guard to clean chips. Simply raise guard to its upper position.

**Safety chain must be used.** Loop chain around the work piece and feed through the machine's handle and clip in place.

## **MOUNTING ANNULAR CUTTERS**

**CAUTION: Never use a cutting tool that is larger than the maximum rated capacity of the machine.**

1. To insert an annular cutter, first insert the pilot pin into the cutter. Then slide the cutter into the arbor, align the proper flat with the locking screw(s) and tighten securely with the supplied hex wrench.



**CAUTION: Ensure that the locking screw is on a flat of the cutter and not just against the rounded shank.**

2. Ensure that the oil feed tap is on and coolant feeds properly by pushing the pilot pin. If it feeds too quickly or slowly, adjust the tap accordingly. Keep the tap closed when not in use.



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## **SPECIAL INSTRUCTIONS FOR 4-SPEED MT3 EQUIPPED MODELS**

### **CHANGING TOOLS & ADAPTORS WITH MT3 SHANK**

To insert a tool, turn the tool until the tang lines up and firmly push into place. It is helpful to tap with a soft-faced mallet to fully engage the taper. If it is properly in position, one will not be able to pull it back apart by hand. To remove, line up the ejector slot of the arbor with the ejector port in the gear case, slide the ejector drift into the slot and tap with a hammer to eject the tool.



**CAUTION: When removing, take care that the cutting tool does not crash down and get damaged or injure anyone below.**

### **MT3 ANNULAR CUTTER ADAPTOR**

This machine is equipped with a unique annular cutter adaptor system with built-in coolant directly to the gearbox. No stop bar is needed.

1. To install the annular cutter adaptor, first insert the taper end of the adaptor into the arbor of the machine as described above.
2. Attach the coolant tank to the slide and ensure that the tube is attached properly.
3. To insert an annular cutter, first insert the pilot pin. Then slide the cutter into the adaptor, align the proper flat with the locking screw(s) and tighten securely with the supplied hex wrench.
4. Ensure that the oil feed tap is on and coolant feeds properly by pushing the pilot pin. If it feeds too quickly or slowly, adjust the tap accordingly. Keep the tap closed when not in use.

### **OPERATION**

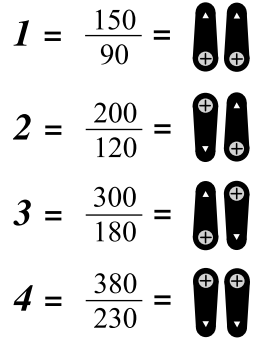
The operation instructions under "OPERATION-GENERAL" also apply to this machine. Please see the additional instructions specific to the 4-speed Morse taper model below:

# PORTABLE MAGNETIC CORE DRILLING SYSTEM

**WARNING: NEVER** operate 60mm (2-3/8 in.) or larger cutters unless the plate thickness is minimum 20mm (13/16 in.) **MAGNET LIFTING MAY RESULT.** If the plate thickness is not enough, supplement the magnetic adhesion by adding a 10mm or thicker plate directly the magnet's position under the work piece.

**CAUTION: Machine is equipped with a reversing switch. Always ensure that direction of rotation is correct before operating. Operating in the wrong direction could result in damage to the cutter.**

Select desired gear range by first popping the tab out of its detent and then sliding selectors up or down in the proper combination. Refer to the chart to achieve the correct combination for the desired speed. (It may be necessary to turn the arbor slightly in order for the gears to mesh properly). Follow the recommended speed ranges on the cutting speed chart to set the proper speed and gear range.



## 4 SPEED GEAR CHART:

GEAR	NO LOAD SPEED	FULL LOAD SPEED	CUTTERS	TAPS
1	150/min	90/min	60~75mm (2-3/8 to 3 in.)	15~25.4mm or less (9/16 to 1 in.)
2	200/min	120/min	45~60mm (1-3/4 to 2-3/8 in.)	N/A
3	300/min	180/min	35~45mm (1-3/8 to 1-3/4 in.)	N/A
4	380/min	230/min	35mm or less (1-3/8 in.)	N/A

**NOTE: These speeds are general recommendations only. The material should determine actual speeds and the cutting speed recommended by the cutting tool manufacturer.**

**NOTE: the left and right side gear selectors have a different engagement design:**

**For The LEFT HAND SLIDER must ALWAYS ensure that the machine is FULLY STOPPED before attempting to change gears! NEVER change the Left hand slider gears on a running machine!**

# **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

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For the RIGHT HAND SLIDER the gears select by engagement dogs, similar to a motorcycle transmission design. These **MUST BE SELECTED BY TURNING THE ARBOR** to allow the dogs to engage. They may also be engaged while the motor is running, provided that it is not under load.

Select desired direction of rotation. This switch has 3 positions: up is forward, middle is neutral, and down is reverse rotation.

**WARNING:** If the motor is switched on with the direction switch in the neutral position, the machine will not turn but will be “live”, as soon as either forward or reverse is selected, the arbor will begin turning! Take due care to avoid surprises. This is **NOT** the proper order of operations. Proper order of operations for normal drilling (not tapping) is as follows: magnet: on. direction: forward. motor: on. motor: off. magnet: off.



## **TWIST DRILLS**

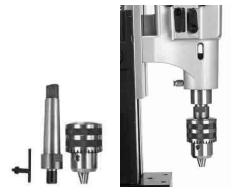
**NOTE:** A pilot hole may be necessary when drilling with larger twist drills. If a MT3 twist drill is used, it may not be necessary to remove the arbor support bracket.



## **CHUCK**

If a MT3 chuck adaptor & chuck are used, then the bracket must be removed.

To replace, see the instructions above under “ARBOR SUPPORT BRACKET REPLACEMENT”.



## **TAPPING**

**CAUTION:** To avoid damage to the tap, always very carefully line the tap up with the hole and ensure that the size of the hole is correct for the tap to be used.

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**CAUTION: To avoid damage to the tap or machine, be very careful to stop the machine in time to NOT allow the tap bottom out. The motor continues to coast for a while after being shut off, so plan for this and anticipate. This machine does NOT have a clutch.**



**CAUTION: To avoid damage to the machine, ALWAYS allow the machine to come to a full stop before reversing rotation.**

1. Select the proper speed according to the chart for the size of tap used.
2. Begin with forward direction of rotation with standard right hand threads.  
(Opposite with left-hand threads)
3. Allow the tap to determine the feed rate. A light touch on the feed handle is all that is needed once it is started in the hole.
4. When the desired thread is tapped, hit the red motor stop switch. Allow the machine to come to a full stop. Then reverse direction and restart machine by pressing the green motor switch to remove tap. Guide the tap back out with the feed handle. Proper order of operations for normal tapping is as follows: magnet: on. direction: forward. motor: on. motor: off. THEN: direction: reverse. motor: on. motor: off - magnet: off.

## **MAINTENANCE**

1. Keep the machine clean and free of chips.
2. Check for loose fittings and tighten as needed.
3. Ensure that the ventilation slots are clear so that motor can be cooled normally. Blow low-pressure compressed air through the ventilation slots with the motor running to keep motor clean.

## **THE ARBOR SHAFT**

Keep the arbor shaft free of dirt and lightly grease as needed. If the arbor support bearing is noisy, it may be dirty or have a chip lodged in it. Remove the arbor shaft to clean and re-grease the arbor support bearing.

# **PORTABLE MAGNETIC CORE DRILLING SYSTEM**

## **THE GIBS (DOVETAIL SLIDES)**

The gibs require adjustment if too loose. To adjust, loosen the lock nuts and adjust the adjustor screws evenly while moving the handle up and down. Adjust so that there is no free play, yet any binding anywhere in its range of travel. Then retighten the lock nuts. Periodically check, lubricate, and adjust as needed.



## **THE CARBON BRUSHES**

The carbon brushes are a normal wearing part and must be replaced when they reach their wear limit.

**Caution: Always replace the brushes as a pair.**

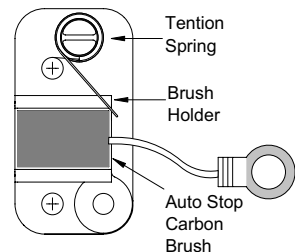
### **To replace:**

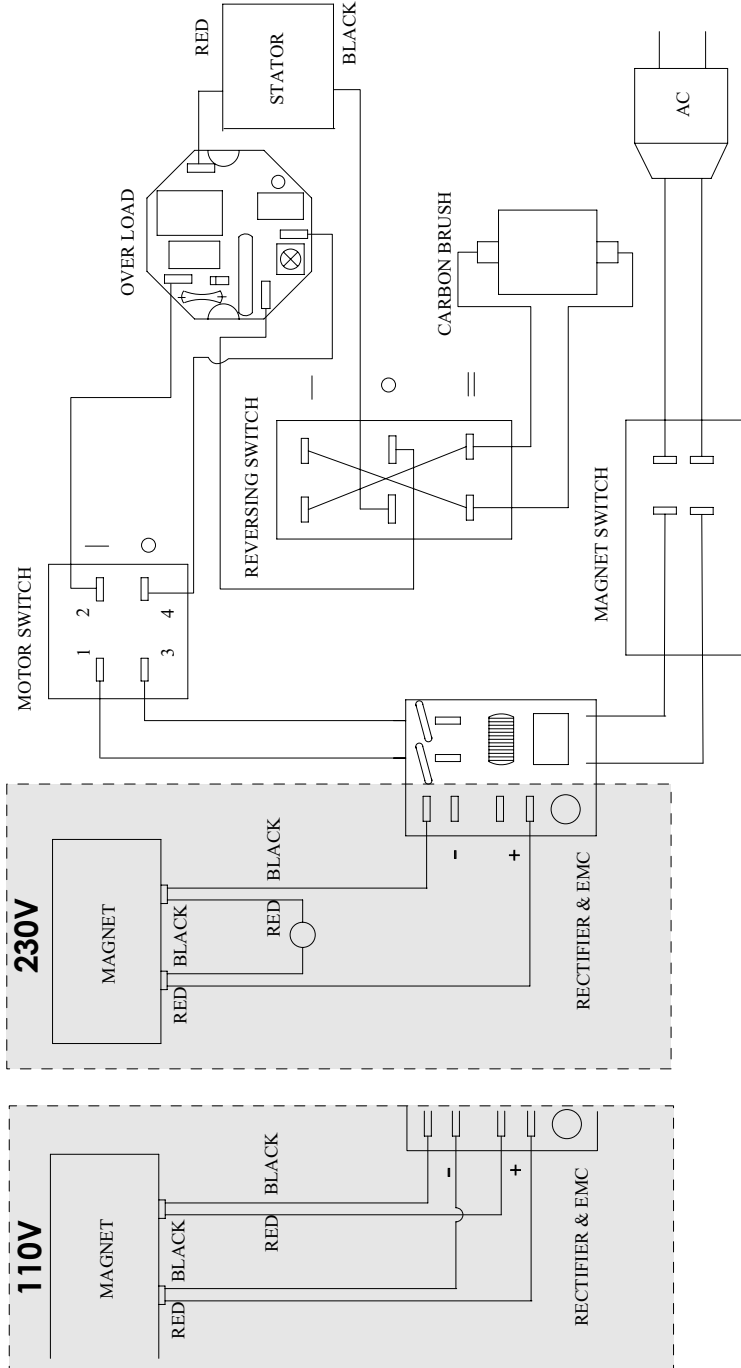
1. Remove the 4 screws and remove the motor tail cover.
2. Using pliers rotate the brush spring out of the way and slide the old carbon brush out of the brush holder.
3. Unscrew the screw to remove the brush lead. The old carbon brush may now be lifted away.
4. Install a new brush. Installation is the reverse of removal.
5. Replace the motor tail cover.



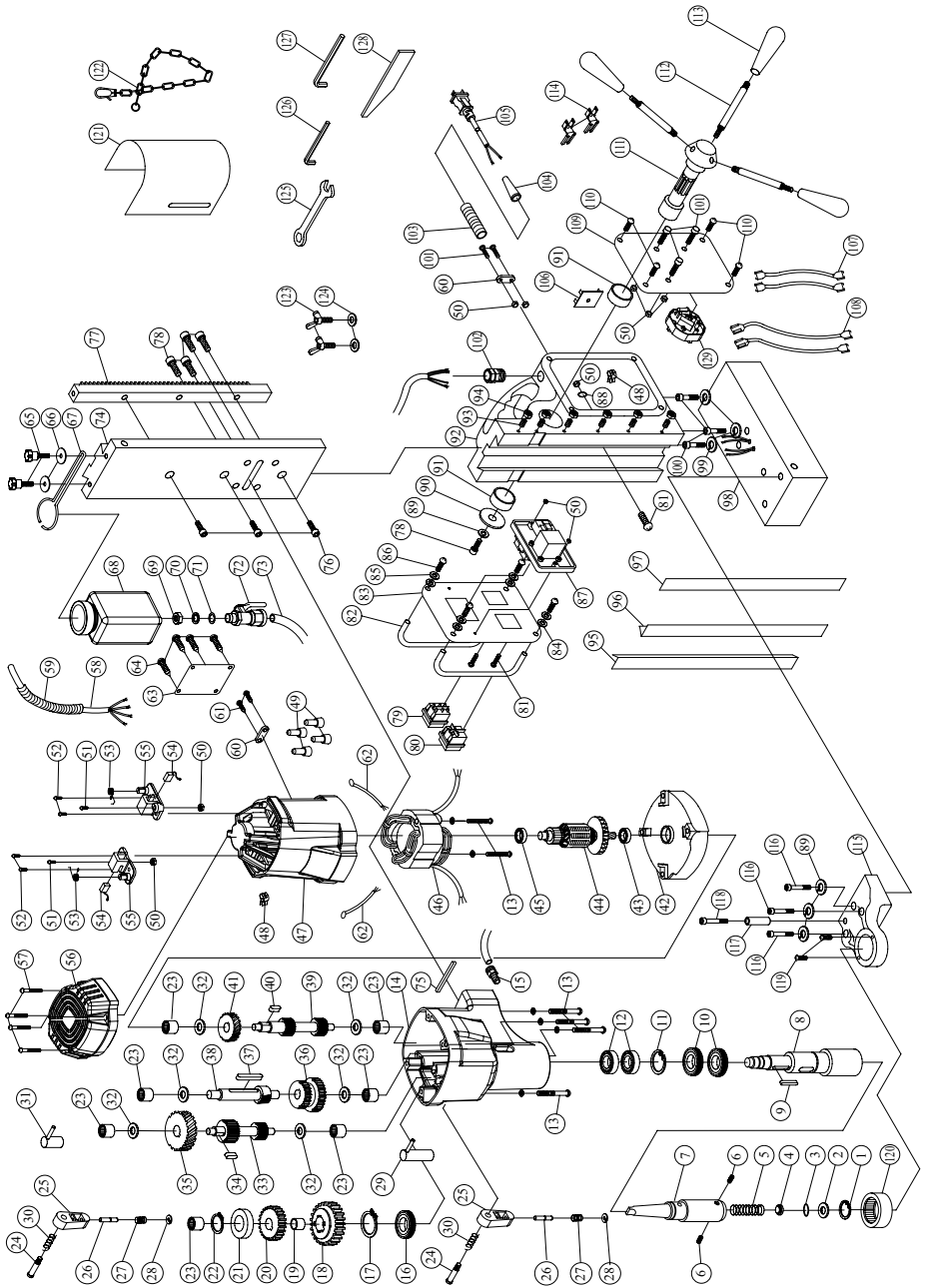
## **AUTO STOP CARBON BRUSH**

Due to the new auto stop carbon brush if the machine comes to a stop without any reason, the brushes have to be checked. The auto feature stops the machine before the carbon brushes are finished and protects the motor.











Item No.	Parts Name		QTY	Item No.	Parts Name		Q'TY
1	INTERNAL CIR CLIP	R-19	1	66	FLAT WASHER	M5	2
2	ARBOR WASHER		1	67	COOLANT TANK BRACKET		1
3	RING	12x4	1	68	COOLANT TANK	400CC	1
4	WATER SEAL		1	69	BRASS NUT		1
5	SPRING		1	70	FLAT WASHER	10x23x2	1
6	SET SCREW	M8x7	2	71	O-RING	10.7x2	1
7	MT3 ARBOR		1	72	COOLANT TAP		1
8	SPINDLE		1	73	COOLANT TUBE		1
9	WOODRUFF KEY	5x5x40	1	74	SLIDE PLATE		1
10	OIL SEAL	40x55x7	2	75	WOODRUFF KEY	M4x4x30	1
11	INTERNAL CIR CLIP	R-55	1	76	CAP BOLT	M8x20	3
12	BEARING	6006zz	2	77	GEAR RACK		1
13	SCREW	M5x60	6	78	CAP BOLT	M8x16	5
14	GEAR CASE		1	79	REVERSING SWITCH		1
15	COOLANT INLET		1	80	MAGNET SWITCH		1
16	OIL SEAL	30x45x5	1	81	SCREW	M4x12	3
17	EXTERNAL CIR CLIP	S-30	1	82	GUARD BAR		2
18	LOW SPINDLE GEAR	21T	1	83	SWITCH PANEL		1
19	BUSHING	18x20x11.5	1	84	FLAT WASHER	M4	4
20	HIGH SPINDLE GEAR	25T	1	85	SPRING WASHER	M4	4
21	SPACER		1	86	CAP BOLT	M4x16	4
22	INTERNAL CIR CLIP	S-14	1	87	MOTOR SWITCH		1
23	BEARING	HK1010	7	88	SUN WASHER	M5	1
24	SELECTOR SCREW		2	89	SPRING WASHER	M8	4
25	SELECTOR TAB		2	90	FLAT WASHER	ø40x8x2.5	1
26	DETENT PIN		2	91	BUSHING	32x38x12	2
27	SPRING		2	92	STAND BODY		1
28	E-CLIP		2	93	SET SCREW	M5x25	6
29	FIRST SELECTOR FORK		1	94	NUT	M5	6
30	SPRING		2	95	GIB STRIP-LEFT		1
31	SECOND SELECTOR FORK		1	96	GIB STRIP-RIGHT		1
32	THRUST WASHER	1024	6	97	GIB STRIP TENSIONER		1
33	LAY SHAFT	16T.7T	1	98	MAGNET		1
34	WOODRUFF KEY	5x5x10	1	99	SPRING WASHER	M6	3
35	LAY GEAR	S45C	1	100	CAP BOLT	M6x20	3
36	INTERMEDIATE GEAR	20T.30T	1	101	SCREW	M4x25	5
37	WOODRUFF KEY	5x5x50	1	102	CABLE GLAND		1
38	COUNTERSHAFT PINION	12T	1	103	STRAIN RELIEF		1
39	MAIN SHAFT PINION	10T.12T	1	104	CORD ARMOR		1
40	WOODRUFF KEY	5x5x8	1	105	POWER SUPPLY CABLE		1
41	INPUT GEAR	29T	1	106	RECTIFIER & EMC		1
42	GEAR PLATE		1	107	WIRE LEADS		2
43	BEARING	6202 2RS	1	108	WIRE LEADS		2
44	ARMATURE		1	109	SIDE COVER		1
45	BEARING	6200zz	1	110	SCREW	M4x8	4
46	STATOR		1	111	CRANK SPINDLE		1
47	MOTOR HOUSING		1	112	CRANK HANDLE		3
48	CABLE CLAMP		2	113	HANDLE GRIP		3
49	WIRE CONNECTOR	C4	4	114	WIRE CONNECTOR		2
50	NUT	M4	10	115	ARBOR SUPPORT BRACKET		1
51	SCREW	M4x10	2	116	CAP BOLT	M8x25	3
52	SCREW	M4x12	4	117	TRAVEL STOP		1
53	BRUSH SPRING		2	118	CAP BOLT	M6x40	1
54	CARBON BRUSH	7x17	2	119	SCREW	M4x6	2
55	BRUSH HOLDER	7x17	2	120	BEARING	HK3516	1
56	MOTOR TAIL COVER		1	121	CHIP GUARD		1
57	SCREW	4x20	4	122	SAFETY CHAIN		1
58	MOTOR CABLE		1	123	BUTTERFLY SCREW	M6x10	2
59	CABLE PROTECTOR		1	124	FLAT WASHER	M6	2
60	CORD CLIP		2	125	WRENCH	M8	1
61	SCREW	M4x14	2	126	HEX. KEY	M2-5	1
62	WIRE LEADS		2	127	HEX. KEY	M4	1
63	MOTOR COVER PLATE		1	128	DRIFT		1
64	SCREW	M5x10	4	129	OVER LOAD PROTECTION (OPTIONAL)		1
65	THUMB SCREW		2				

# EDX

**power for finishing**

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