Portable Magnetic Core Drilling System

- ▶ SINGLE SPEED MODELS
- ▶ SEMI-AUTO FEED MODELS
- ▶ 2-SPEED MODELS
- ▶ 4 SPEED VARIABLE MOTOR SPEED MODELS

CE CB

ORIGINAL OPERATING INSTRUCTIONS

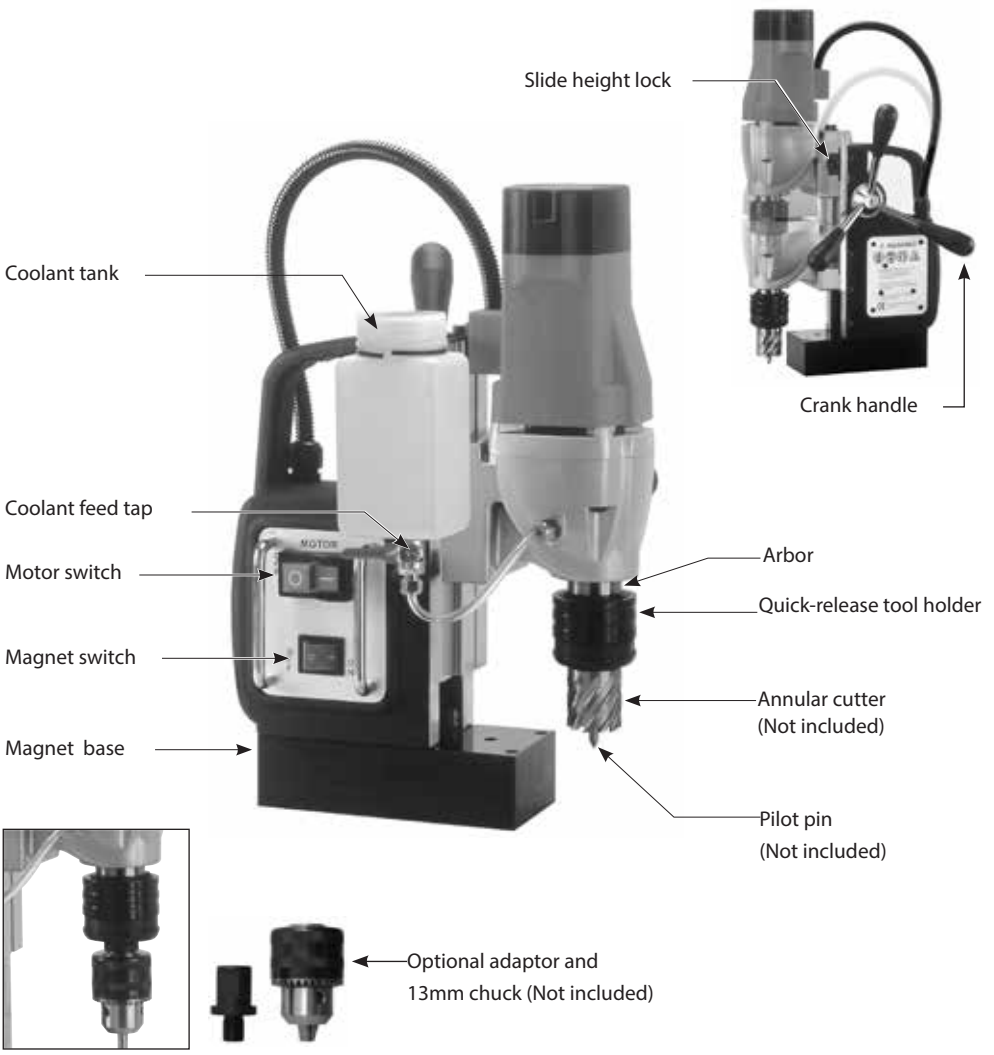
SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE。

Warning:

For tools equipped with over load protection, when motor has shut down off due to over load, always run machine with no load for at least 3 minutes to reduce temperature before returning to operation to avoid burn out of the motor.

Version:20150319

SINGLE SPEED MODELS

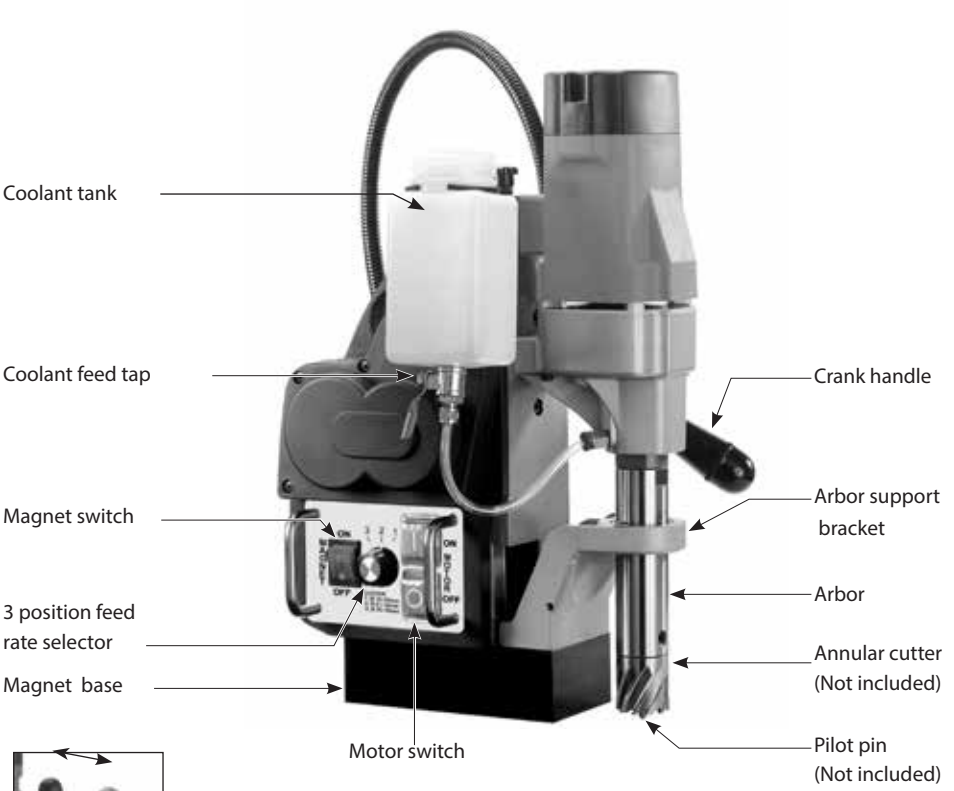


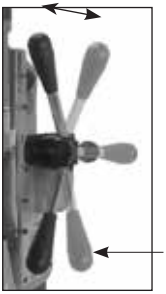
		Low Speed	High Speed
Power Input		1100W	
Voltage		See machine nameplate	
No Load / Full Load min^{-1}		450 / 270	730 / 440
Max. Capacity	Dia. X Depth of cut	35mm x 50mm (1-3/8" x 2")	
	Dia. X Depth Twist Drill Bit	13mm x 140mm (1/2" x 5-1/2")	
Magnetic Adhesion		17,000 N	
Overload Protection		Optional	
Net weight		14kg (30.8Lbs)	

Standard Accessories

* Wrench M8
* T-Wrench M6
* Hex. Key M2.5 & M4
* Chip Guard kit
* Coolant Tank kit
* Safety Chain

SEMI-AUTO FEED MODELS



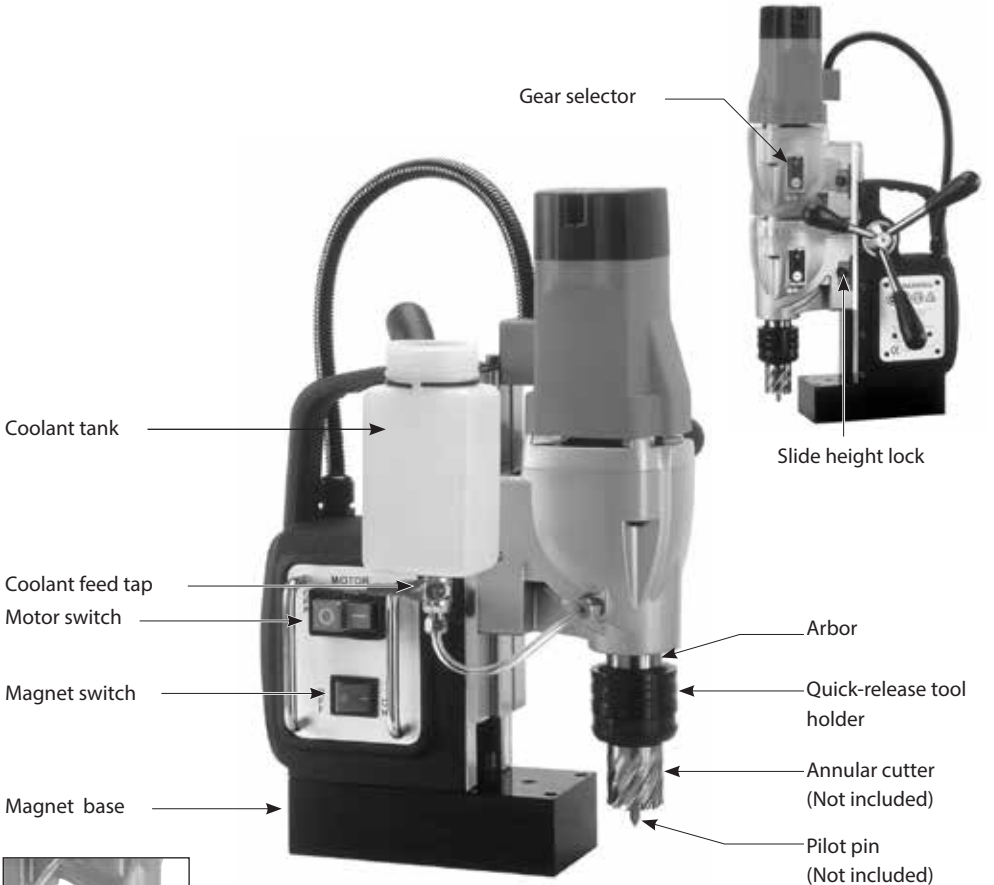


Power input		1100W
Voltage		See machine nameplate
No Load / Full Load min^{-1}		550/330
Max. Capacity	Dia. X Depth of cut	35mm x 50mm (1-3/8" x 2") (Hand Feed)
		30mm x 45mm (1-3/16" x 1-13/16") (Auto Feed)
Magnetic Adhesion		15,000 N
Overload Prptection		With
Net weight		16.5kg (36.3Lbs)

Standard Accessories

* Wrench M8
* Hex. Key M2.5 & M4
* Chip Guard kit
* Coolant Tank kit
* Safety Chain

2-SPEED MODELS



Optional adaptor and 13mm chuck (Not included)

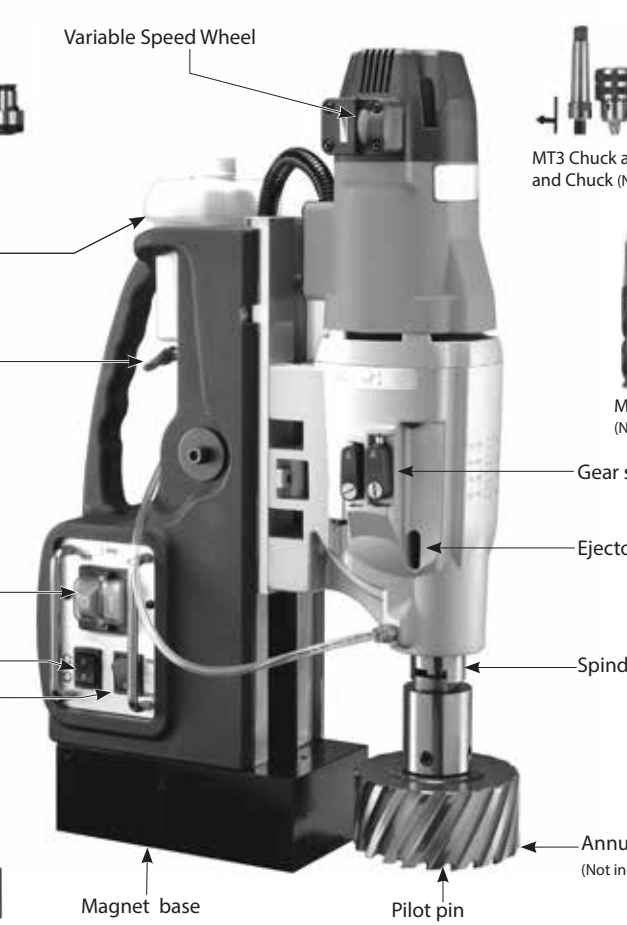
		High Speed	Low Speed
Power Input		1100W	
Voltage		See machine nameplate	
No Load / Full Load min^{-1}	Speed 1	450 / 270	300 / 180
	Speed 2	730 / 440	450 / 270
Max. Capacity	Dia. X Depth of cut	35mm x 50mm (1.2" x 2")	50mm x 50mm (2" x 2")
	Dia. X Depth Twist Drill Bit	13mm x 140mm (1/2" x 5-1/2")	
Magnetic Adhesion		17,000 N	
Overload Protection		Optional	
Net weight		15kg (33Lbs)	

Standard Accessories

* Wrench M8
* T-Wrench M6
* Hex. Key M2.5 & M4
* Chip Guard kit
* Coolant Tank kit
* Safety Chain

4 SPEED VARIABLE MOTOR SPEED MODELS

MT3 Tapping adaptor and Tapping unit (Not included)



MT3 Chuck adaptor and Chuck (Not included)

MT3 Twist drill bit (Not included)

1-1/4 " (32.7mm) Weldon shank annular cutter arbor

Power Input		1700W (110V), 2000W(220V)
Voltage		See machine nameplate
No Load / Full Load min^{-1}	Speed 1	35 - 120
	Speed 2	70 - 220
	Speed 3	80 - 250
	Speed 4	140 - 450
Max. Capacity	Dia. X Depth of cut with Annular Cutters	120mm x 50mm (4-3/4" x 2")
	Dia. X Depth of MT3 Twist Drill Bit	32mm x 150mm (1-1/4" x 6")
	Dia. X Depth of MT3 Chuck adaptor with Twist Drill bit	16mm x 110mm (5/8" x 4-5/16")
	Dia. X Depth of Taps	25.4mm x 40mm (1" x 1-9/16")
Magnetic Adhesion		32,000 N
Overload Protection		Standard
Net weight		27kg (59.4Lbs)

Standard Accessories

* Wrench M8
* Hex. Key M2.5 & M5
* Chip Guard kit
* Coolant Tank kit
* Safety Chain
* Drift

*** Max. Dia. x Depth of cut with Annular Cutters with 19mm Weldon or Quick-Release Arbor: 60mm x 50mm (2-3/8" x 2")**

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.

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

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.

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.

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
ø	Diameter	Size of drill bits
n_0	No load speed	Rotational speed, at no load
min^{-1}	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 I construction	With electrical earth
⚠	Warning symbol	Alerts user to warning messages

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 and free of rust and scale.

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 to 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. When drilling stacked work materials, always stop to clear the slug after the first layer is drilled.

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: Do not operate the machine on a workpiece which is being welded on at the same time. This may lead to damage to the machine and possible injury.

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. When drilling non-ferrous (non-magnetic) work materials, only use a manufacturer-approved fixture such as a vacuum base adapter

ASSEMBLY

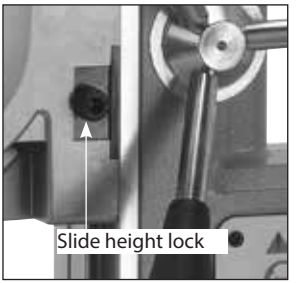
Coolant tank assembly required. First attach clear tube to the bottom of the coolant tank. To do this, first loosen the nut and slide nut onto the tube. Then slide tube onto the nipple. Then tighten the nut. Slide tank hanger over the screw on the upper right hand side of slide and tighten. Finally insert 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.

ADJUSTING THE SLIDE HEIGHT (4-Speed and Semi-Auto Feed models do not apply)

Adjustable slide height models allow the operator to quickly change the height position of the motor head on the slide. This is useful when switching between twist drills and annular cutters, for example. For annular cutters, use the lowest position possible for best stability. For twist drills, raise the motor head to allow enough clearance for the twist drill to be mounted.

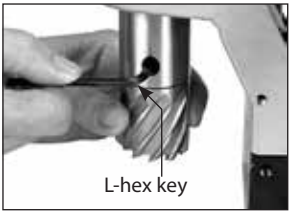


To adjust:

1. Using the T-handle hex wrench, loosen the socket cap screw on the Slide Height Lock.
2. Slide the motor head to the desired position.
3. Tighten the Slide Height Lock.

MOUNTING ANNULAR CUTTERS

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

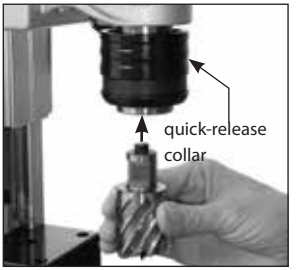


For set screw type arbors:

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 L-hex key.

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

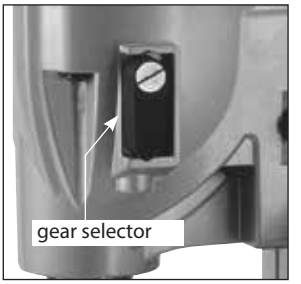
FOR QUICK-RELEASE TYPE ARBORS:



Push up on the quick-release collar. Insert the cutter with pilot pin and turn until the flat meets the locking pin. When the flat meets the locking pin, the collar will snap down. Double check to ensure that it is fully locked.

2-SPEED MODELS

GEAR SELECTION



On 2-speed models, before drilling, select the desired gear range by first swinging the gear selector tab out of the detent slot then shifting into the correct mode. Then pop the selector tab back into the detent. It will usually be necessary to turn the spindle by hand a little to get it to shift all the way.

2 SPEED GEAR CHART

High Speed models

GEAR	NO LOAD SPPEED	FULL LOAD SPEED	CUTTER SIZE
1	450 min^{-1}	270 min^{-1}	Up to 30mm (1-3/16") HSS cutters
2	730 min^{-1}	440 min^{-1}	Up to 30mm (1-3/16") TCT cutters

Low Speed models

GEAR	NO LOAD SPPEED	FULL LOAD SPEED	CUTTER SIZE
1	300 min^{-1}	180min^{-1}	Up to 50mm (2") HSS cutters
2	450 min^{-1}	270 min^{-1}	Up to 50mm (2") TCT cutters

NOTE: These speeds are general recommendations only. Actual speeds should be determined by the material and the cutting speed recommended by the cutting tool manufacturer. See the section below "RECOMMENDED SURFACE SPEEDS" and use the formula to calculate the best RPM.

CAUTION: Ensure that that gears engage fully.

CAUTION: ALWAYS ensure that the machine is fully stopped before attempting to change gears! NEVER change gears on a running machine!

OPERATION-GENERAL

WARNING: Always ensure that the magnet is adhered properly to the work piece before beginning drilling.

NOTE: If mounting to a curved surface beam, mount the machine parallel to the curve in the work piece.
WARNING: Avoid operating at more than 90 degrees from horizontal. When drilling at such an angle take precautions to prevent cutting coolant from entering the motor. Paste-type coolant should be used.

1. First fit tool into arbor and line up with intended center of cut. Then switch magnet on.
2. Press green motor on button to start motor. Use the crank handle to feed to work. Always use very light pressure when beginning the cut and just as the tool is breaking through. The crank handle offers tremendous leverage; so do not use too much force. Allow the cutting tool to determine the pace. With experience, the operator will be able to determine the best pace to feed to the work. There should be some degree of audible slowing of the motor but not bogging in the cut. Correct cutting speed with a properly sharp annular cutter will produce long unbroken chips, which produce a "bird's" nest. shaped bundle of chips around the cut.

NOTE: Always ensure that the cutting tool is sharp. A dull cutter typically will have finer and/or choppy shavings.

WARNING: ALWAYS clear chips when there is too much build-up. Excessive chip build-up could result in a jammed cutter or other hazardous situation.

WARNING: the slug ejects at end of cut and is very hot. Always provide a method of catching the slug, where the ejected slug may cause injury to people below.

Note: Lock the slide lock on the side of the machine in the fully raised position when at rest to prevent the slide from accidentally slamming down - remember to unlock it again before commencing drilling.

CAUTION: Never attempt to cut half-circles or to stitch drill (drill overlapping holes) with a TCT cutter. This may destroy the cutter.

CAUTION: Never attempt to re enter a half-finished cut if the magnet has been turned off and the machine shifted in the interim. This may destroy the cutter.

CAUTION: Do not leave the magnet on for extended periods of time. This will lead to overheating of the coils and subsequent early failure. Only turn the magnet on when you are ready to drill and turn back off when you are done.

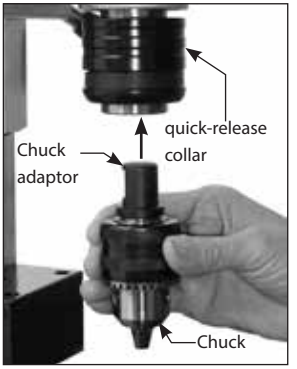
Magnet Base Duty Cycle:

Do not leave the magnet base activated continuously for more than 60 minutes. If the magnet base is

overheated, allow it to cool for 30 minutes before continuing.
This machine is not intended for production-line type use.

CAUTION:Turn the magnet base off when not in use. Leaving the magnet base on continuously will damage it.

TWIST DRILLING (All models except Semi-Auto Feed models)



1. First mount the Chuck to the Chuck adaptor.
2. Then push up on the Quick-Release Collar. Insert the Chuck Adaptor into the Tool Holder and turn until the Quick-Release Collar snaps down.
3. Always double check to ensure that the Quick-Release Tool Holder is fully locked.
4. Insert the twist drill into the Chuck and tighten with the chuck key.

SPECIAL INSTRUCTIONS FOR SEMI-AUTO FEED MODELS:

WARNING: NEVER attempt to use machine in auto feed mode when using twist drills. THIS WILL RESULT IN MAGNET LIFTING.

WARNING: NEVER use poor quality, incorrect sized or dull cutters in auto feed mode. THIS MAY RESULT IN MAGNET LIFTING.

The Auto-Feed Feature

A lever incorporated into the feed handle engages or disengages the feed drive gears. If the auto-feed mode is not engaged, the machine may be used in the same fashion as the manual machine as described above. Below are the additional instructions needed to operate in auto-mode.

IMPORTANT: When in manual mode, the three lever handles will be pointing outward slightly (out). When in auto-feed mode, the lever handles will be parallel with the side of the machine (in).

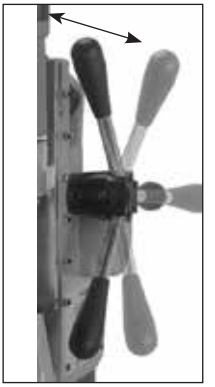
NOTE: Do not operate the auto machine banked to one side in the plane of the lever as this may allow the machine to slip into or out of auto-feed mode unexpectedly.
WARNING: Do not attempt to drill a work piece which is thicker than the maximum cutting depth of the cutter being used. Never exceed 30mm diameter cutters when using auto-feed mode.

THE FEED RANGE SELECTOR

There is a 3-position range selector switch on the switch panel which allows ideal feed rate for various sized cutters. Select the feed range which corresponds to the cutter diameter being used.

POSITION	RANGE
1	14~20mm
2	21~24mm
3	25~30mm

AUTO-FEED OPERATION



1. Always begin drilling manually (with the handles pointing out) as described above in "OPERATION-GENERAL".
2. Only after the cutter has begun cutting for a few seconds and has raised a chip should the auto feed be engaged.
3. To engage auto-feed, push any of the lever handles in. The gears may not always line up perfectly. If the handle will not push in, simply raise the feed upward slightly and the lever will engage.
4. As a precaution, always keep one hand near to the motor shut off switch in order to shut off quickly in the event of any problem.
5. Once the hole is drilled, the machine will continue to feed for 3 seconds (to fully finish hole) and then will automatically shut off.

NOTE: Do not cut manually for more than 10 seconds before shifting into auto feed. If manual cutting continues for more than 10 seconds, as soon as auto feed is engaged, rather than cutting, it will directly stop.

NOTE: This machine is equipped with safety override systems which will automatically engage: If the load exceeds maximum for 2 seconds or more, the motor and feed will stop and stay in that position. Only the magnet will stay on. This will alert the operator of an overload problem. If this happens repeatedly, stop operation and find the cause of the excessive load. It could be a bad cutter or other problem.

WARNING: WHENEVER THE MACHINE STOPS DUE TO OVERLOAD IN THIS WAY, RAISE THE CUTTER CLEAR OF THE WORKPIECE BEFORE RESTARTING

NOTE: when drilling very deep holes with long reach cutters, there is considerable build up of chips. This may interfere with operation and even cause the machine to stop from overload. In this situation, we recommend stopping to clear the chips after the first 25mm (1 inch) or so, then continuing to finish the cut.

45mm IS THE MAXIMUM DEPTH OF CUTTING WITH AUTO FEED.

NOTE: the maximum rated thickness of material with the auto feed function is 45mm. For drilling thickness up to 50mm, finish by hand feed.

WARNING: PAY ATTENTION TO THE CONDITION OF THE CUTTER. This is particularly important with an auto feed machine. A dull or damaged cutter may cause a dangerous situation.

WARNING: NEVER ATTEMPT TO DRILL MATERIAL THICKER THAN THE DEPTH CAPACITY OF THE CUTTER. If the cutter is allowed to "bottom out" the feed system may cause the magnet to lift (usually it will overload first).

NOTE: In very light load conditions, such as when using very small cutters or drilling a very thin work piece, often the load drop will not be enough to signal the machine's electronic control board to automatically stop. If this occurs, it does not indicate a malfunction.

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.

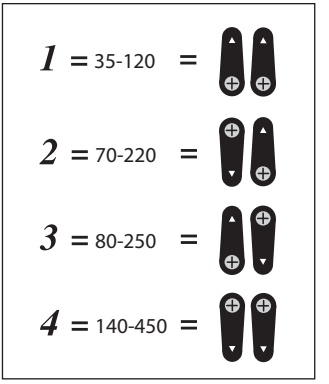
CAUTION: When removing, take care that the cutting tool does not crash down and get damaged or injure anyone below.

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:

WARNING: NEVER operate 60mm (2-3/8 in.) or larger cutters unless the plate thickness is mini mum 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 under 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(VARIABLE MOTOR SPEED MODELS)

GEAR	MAX. SPEED	MIN. SPEED	CUTTERS	TAPS
1	120min^{-1}	35 min^{-1}	Up to 120mm (4-3/4")	25mm (1 in.) or less
2	220 min^{-1}	70 min^{-1}	55mm-70mm (2-1/8 to 2-3/4 in.)	N/A
3	250 min^{-1}	80 min^{-1}	35~55mm (1-3/8 to 2-1/8 in.)	N/A
4	450 min^{-1}	140 min^{-1}	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. See the section below "RECOMMENDED SURFACE SPEEDS" and use the formula to calculate the best RPM.

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!
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 BY HAND to allow the dogs to engage.

VARIABLE MOTOR SPEED MODELS ONLY:

The electronic variable motor speed control allows the motor speed to be lowered for further flexibility for adjusting the cutting speed to suit the size of cutter and type of material. Simply turn the thumb wheel to raise or lower the motor speed electronically.

NOTE: whenever possible, it is always preferable to lower the speed by changing the gear rather than lowering the motor speed. A slower motor speed will have less cooling and somewhat less torque so always try to keep the motor going as fast as possible. Only lower the motor speed if you have no other option. (For example: If you need the RPM at about 100/min, it is much better to use 1st gear at full motor speed than to use 3rd gear at minimum motor speed.)

Avoid overheating the motor: When using the machine at or near maximum capacity with a slow motor speed the motor will be at maximum stress and very hot. After each cut is finished, **ALWAYS** cool the motor by running at no load at the maximum motor speed for a few minutes.

CUTTING SPEEDS

The type of material to be drilled, its hardness and thickness will all greatly affect the recommended cutting speed. See the chart below for general guidelines for cutting speeds. Use the formula to determine the recommended RPM for the diameter of annular cutter being used:

RECOMMENDED SURFACE SPEEDS

Note: work materials which have been flame cut will be heat treated in the affected area. These areas will require much slower cutting speeds.

Work Material	Surface Speed MPM (m/min)
Aluminum	60-90
Brass	40-50
Soft Cast Iron	30-50
Hard Cast Iron	15-21
Mild Steel	24-30
High Tensile Steel	6~13
Stainless Steel	3~5

RPM = 318.5 x MPM / cutter diameter (in mm)
For example: if you are drilling mild steel with a 50mm cutter, the recommended MPM would be about 30 m/min, so the ideal RPM would be:
318.5 x 30/50 =191/min
But if you were drilling high tensile steel, the MPM would be about 6 m/min, so the ideal RPM would be: 318.5 x 6/50 =38/mi**n**

REVERSING SWITCH

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 in 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.

SAFETY CLUTCH

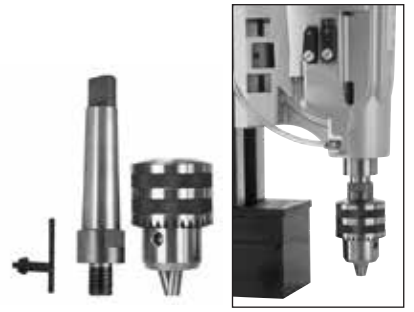
The 4 speed variable motor speed models are equipped with a safety clutch which is designed to slip when the maximum torque value is exceeded. This clutch is not a tapping clutch and bottoming taps in blind hole is to be avoided.

TWIST DRILLS

NOTE: A pilot hole may be necessary when drilling with larger twist drills.

CHUCK

Mount the chuck to the Drill Chuck Arbor. Open the jaws all the way and tighten the central screw to lock the chuck to the arbor.



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.

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 tapping clutch.

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

1. Select the minimum speed (speed range no.1).
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.

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. If an arbor with Quick-Release Tool Holder is being used, follow these instructions: Push up on the quick-release collar. Insert the cutter with pilot pin and turn until the flat meets the locking pin. When the flat meets the locking pin, the collar will snap down. Double check to ensure that it is fully locked.

WARNING: Do not use larger than 60mm cutters in a quick release arbor.

5. 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.

MAINTENANCE

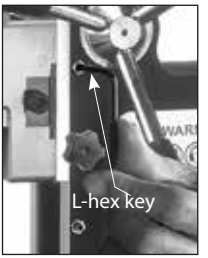
Every 50 hours of operation blow compressed air through the motor while running at no load to clean out accumulated dust. (If operating in especially dusty conditions, perform this operation more often.)

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 -Semi-Auto Feed versions

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.

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, without any binding anywhere in its range of travel. Then retighten the lock nuts. Periodically check, lubricate, and adjust as needed.

THE CARBON BRUSHES

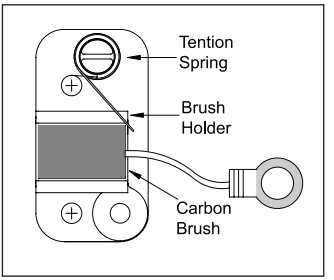
The carbon brushes are a normal wearing part and must be replaced when they reach their wear limit.

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.

CARBON BRUSHES



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

MAGNET TROUBLESHOOTING

Full magnet performance is absolutely essential for magnetic drill operation.
If the magnet works, but does not hold well, it is likely that one of the coils has failed. If the magnet does not work at all, it is likely to be a failed rectifier. (It is highly unlikely that both magnet coils would fail at the same time)

NOTE: A faulty magnet coil can also damage the rectifier, so whenever there is a magnet problem, BOTH the magnet coils and rectifier must be checked.

WARNING: Never attempt to operate a magnetic drill with a faulty magnet!

CHECKING THE MAGNET (qualified technicians only)

If the magnet is not working well, it must be checked. Separate the wires of each indiviual coil and test the resistance of each coil separately. (note that 110V models are wired in parallel and 230V models are wired in series) The resistance of the coils of different sizes of magnets varies, but it should be in the region of hundreds of ohms. Most importantly, both coils must have very nearly the same resistance. If one of the coils has zero resistance, it means that it is shorted. If one of the coils has infinite resistance, it means that the circuit is broken. If either coil has a problem, the magnet must be replaced. A faulty magnet may also cause damage to the rectifier. Also check the rectifier when replacing a faulty magnet. (see below)

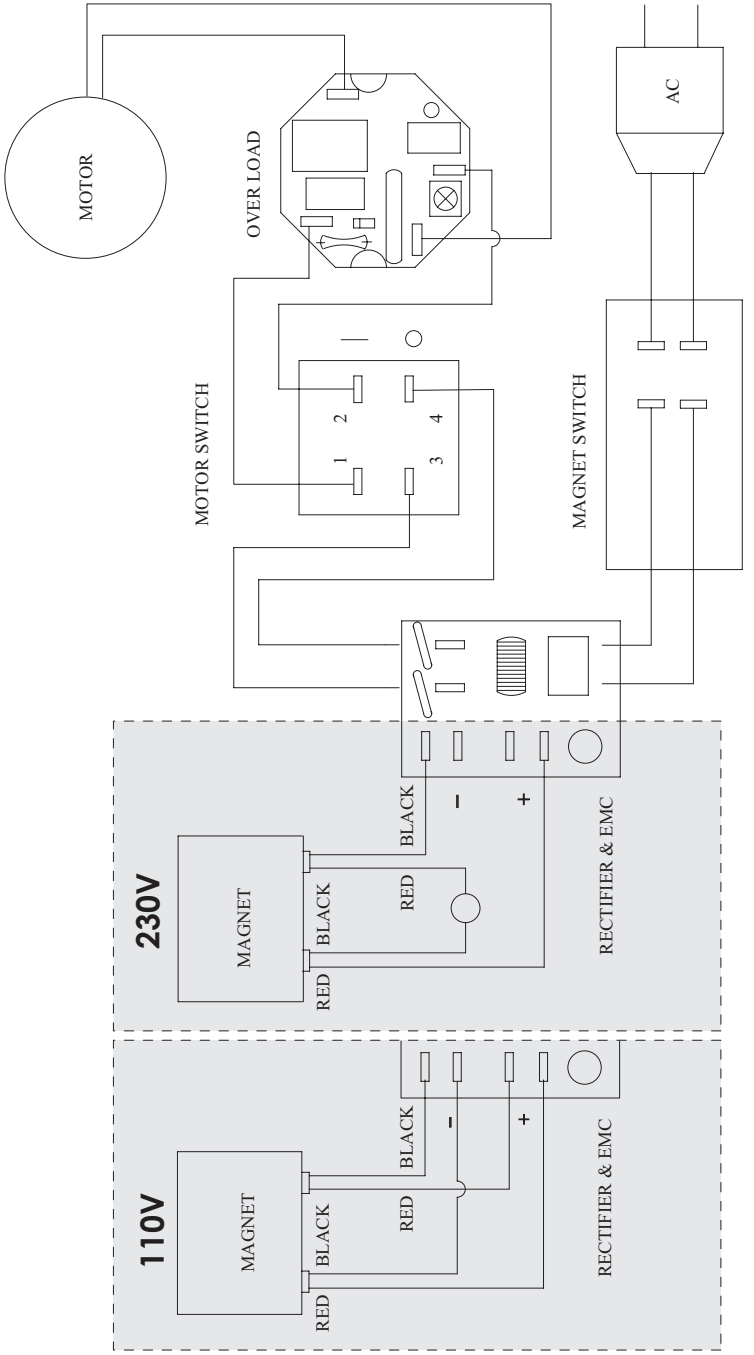
CHECKING THE RECTIFIER (Qualified technicians only)

The rectifier takes the AC household current and converts it to DC to power the magnet. If it fails, the magnet coils will not receive power.
Disconnect the rectifier and test the resistance of both circuits of the rectifier between the AC and the DC sides. Note that polarity matters, so you can only take a reading if test probes are oriented correctly. Each side will be the opposite of the other. Both circuits should have very nearly the same resistance reading. If one of the circuits has zero resistance, it means that it is shorted. If one of the circuits has infinite resistance, it means that the circuit is broken.

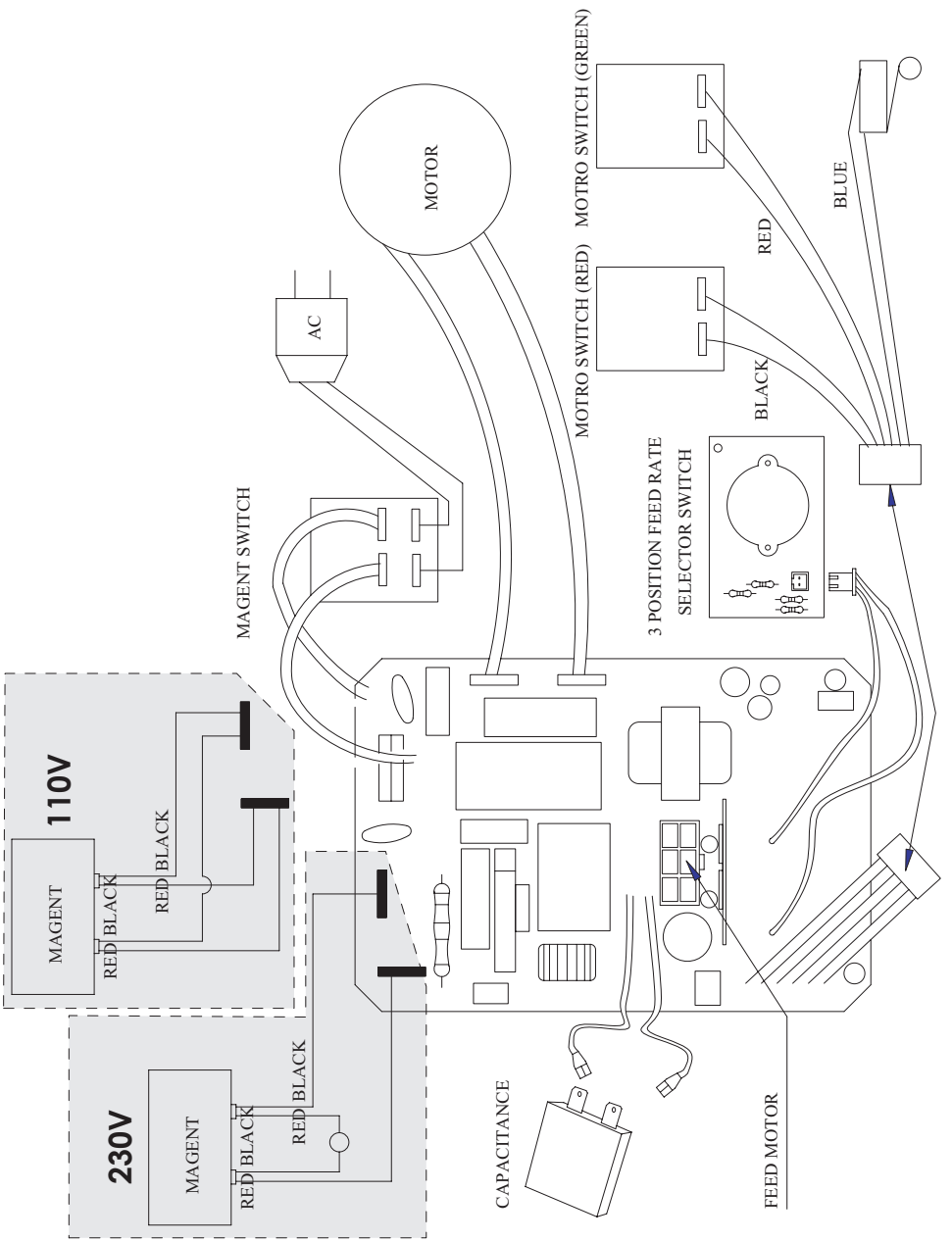
If the replacement of the power supply cord is necessary, this has to be done by the manufacturer or their agent in order to avoid a safety hazard.

WARNING: All repairs must be entrusted to an authorized service center. Incorrectly performed repairs could lead to injury or death.

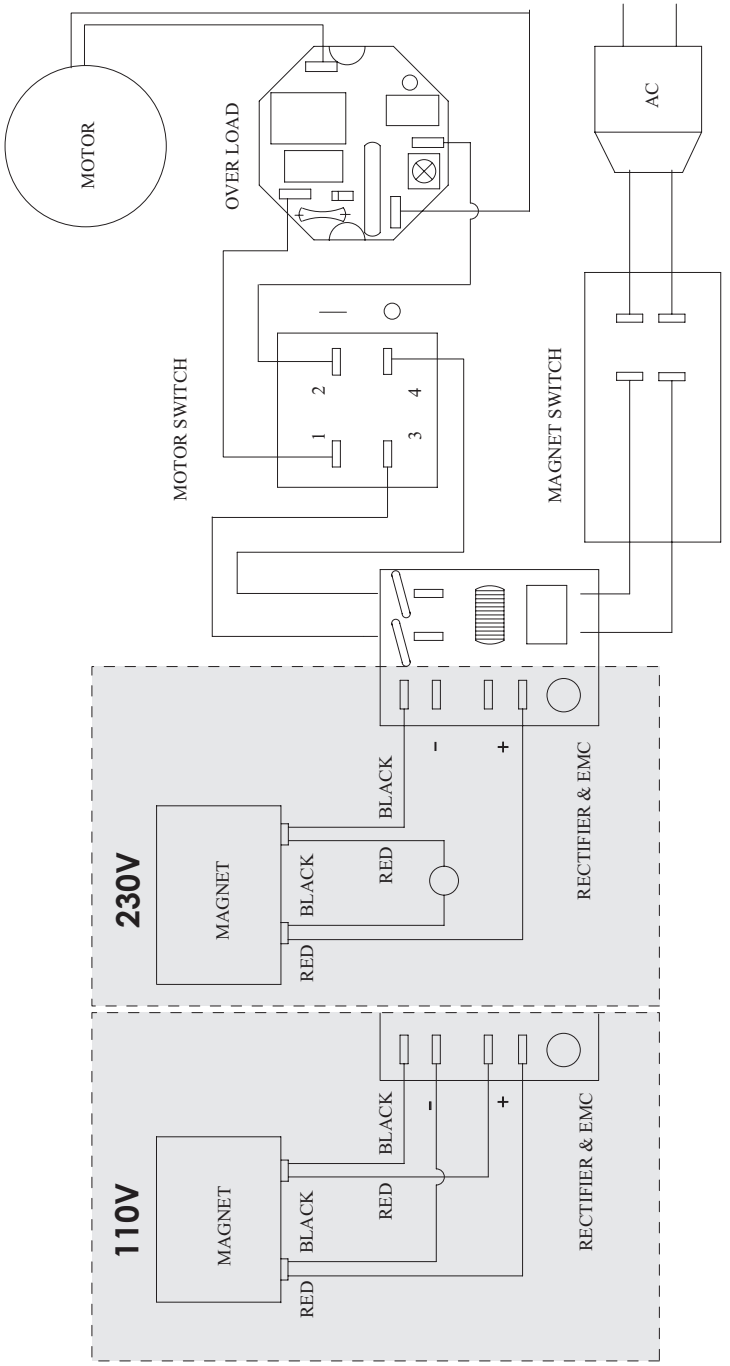
SINGLE SPEED MODELS



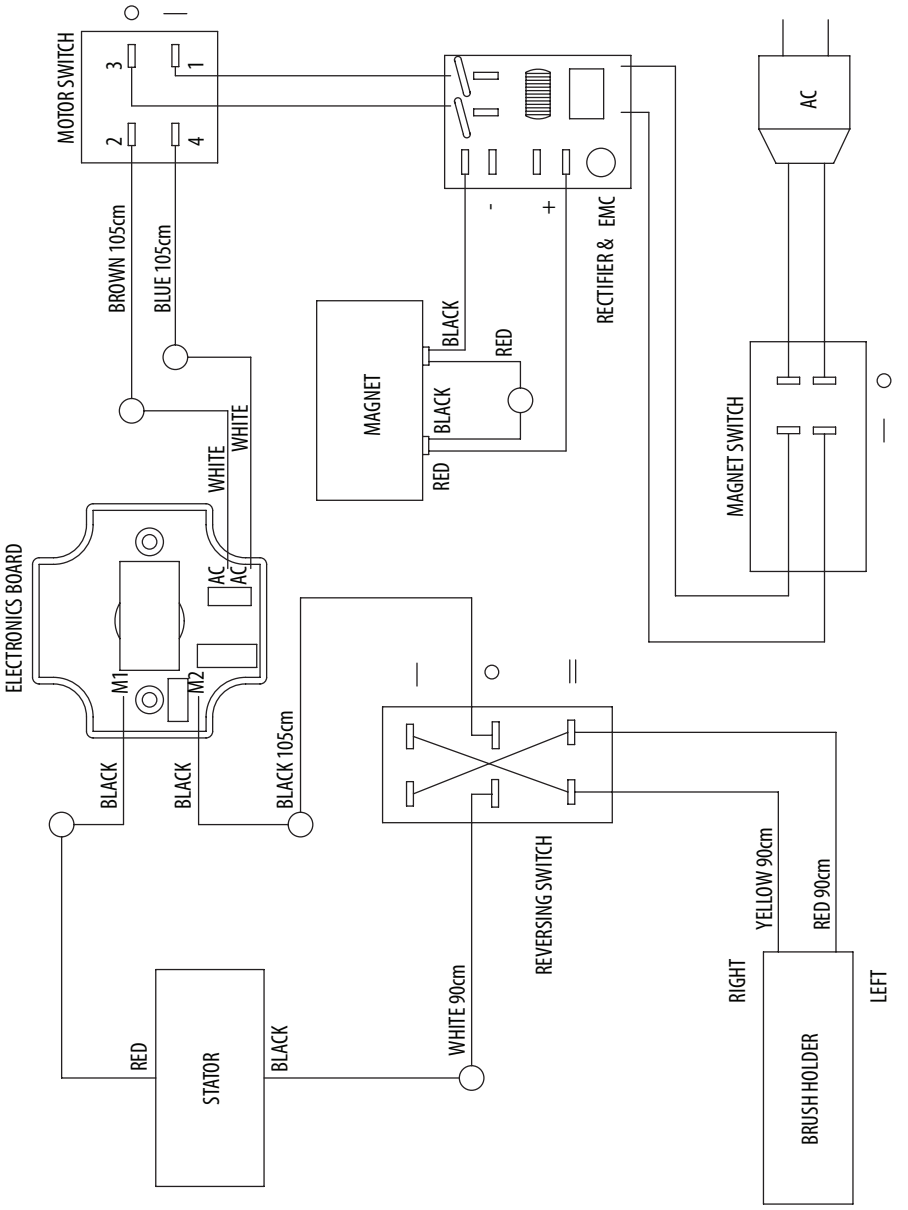
SEMI-AUTO FEED MODELS



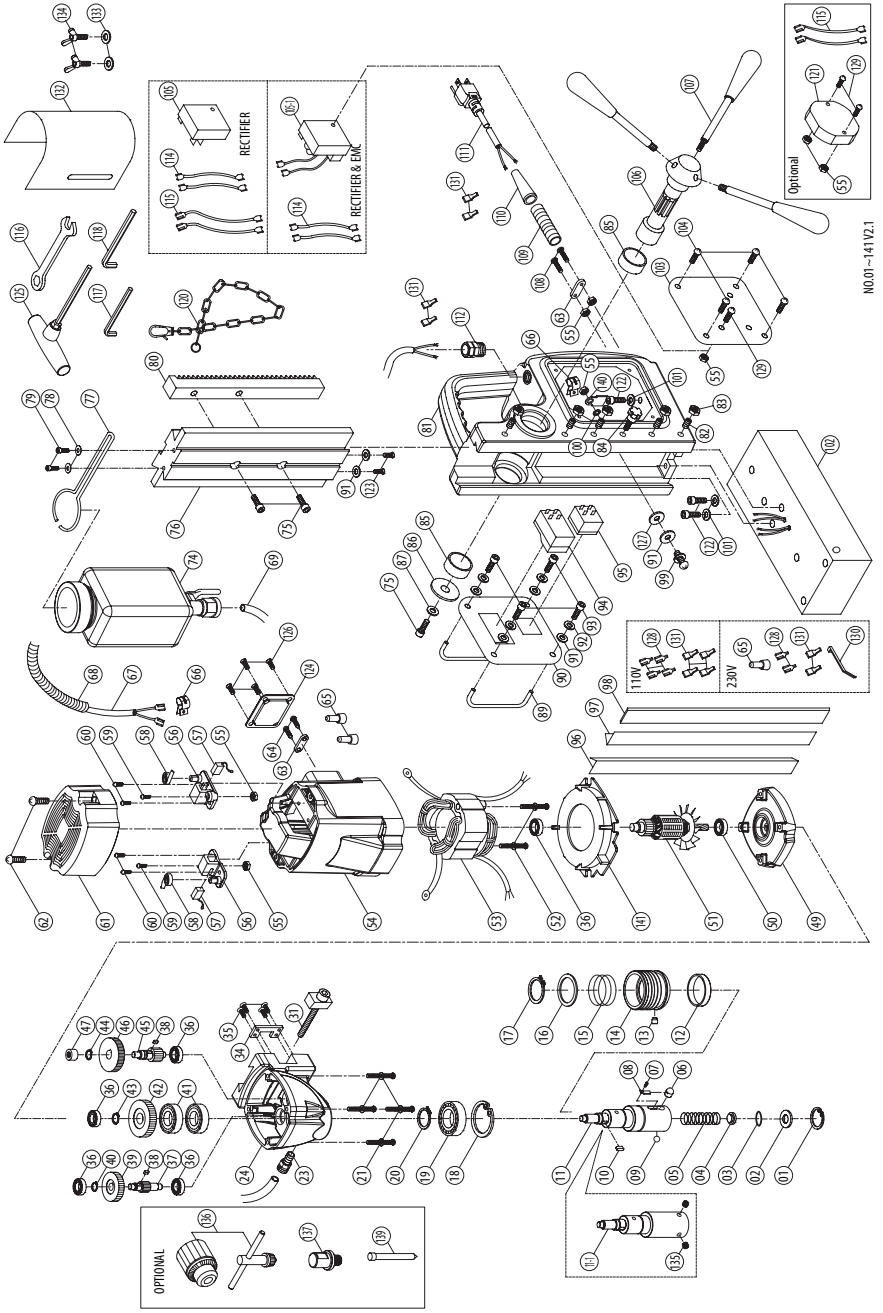
2-SPEED MODELS



4 SPEED VARIABLE MOTOR SPEED MODELS

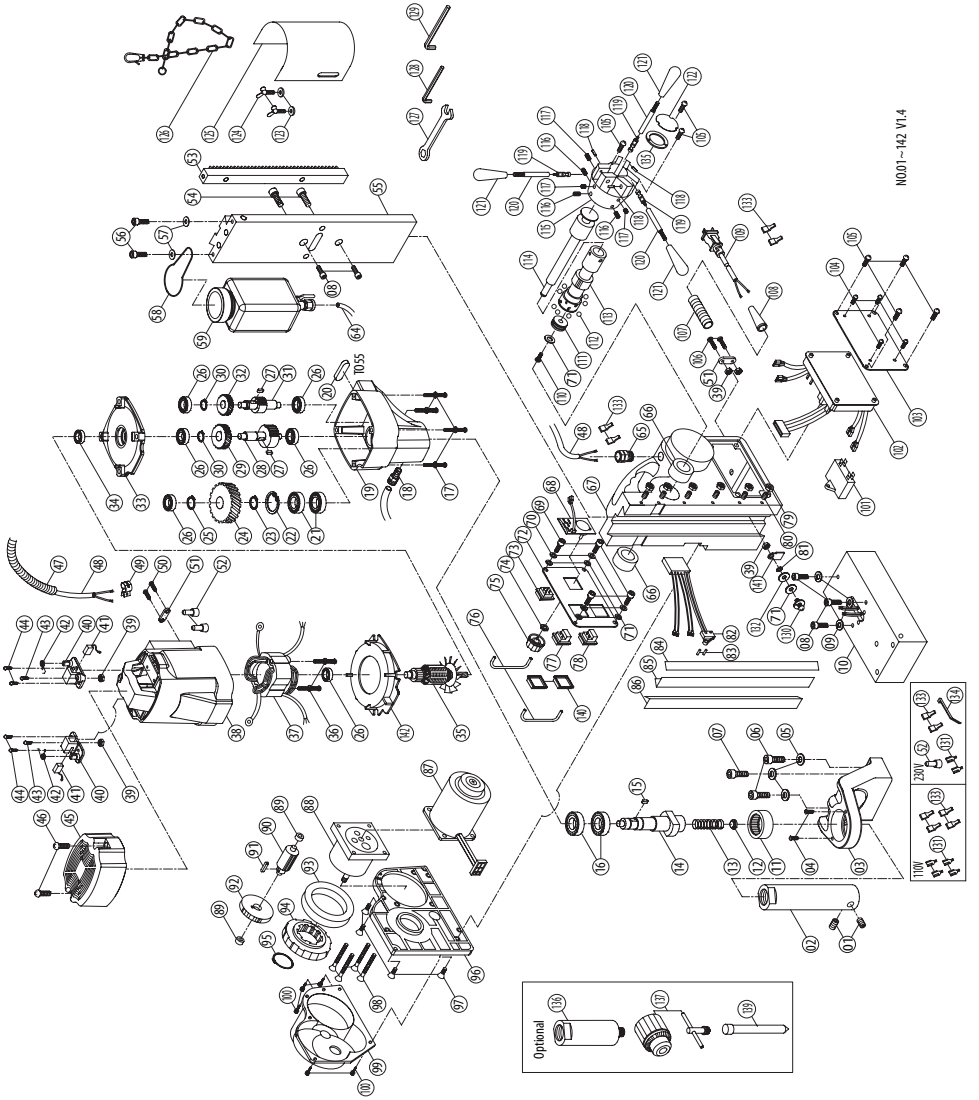


1 Speed Drilling System Exploded View & Parts list



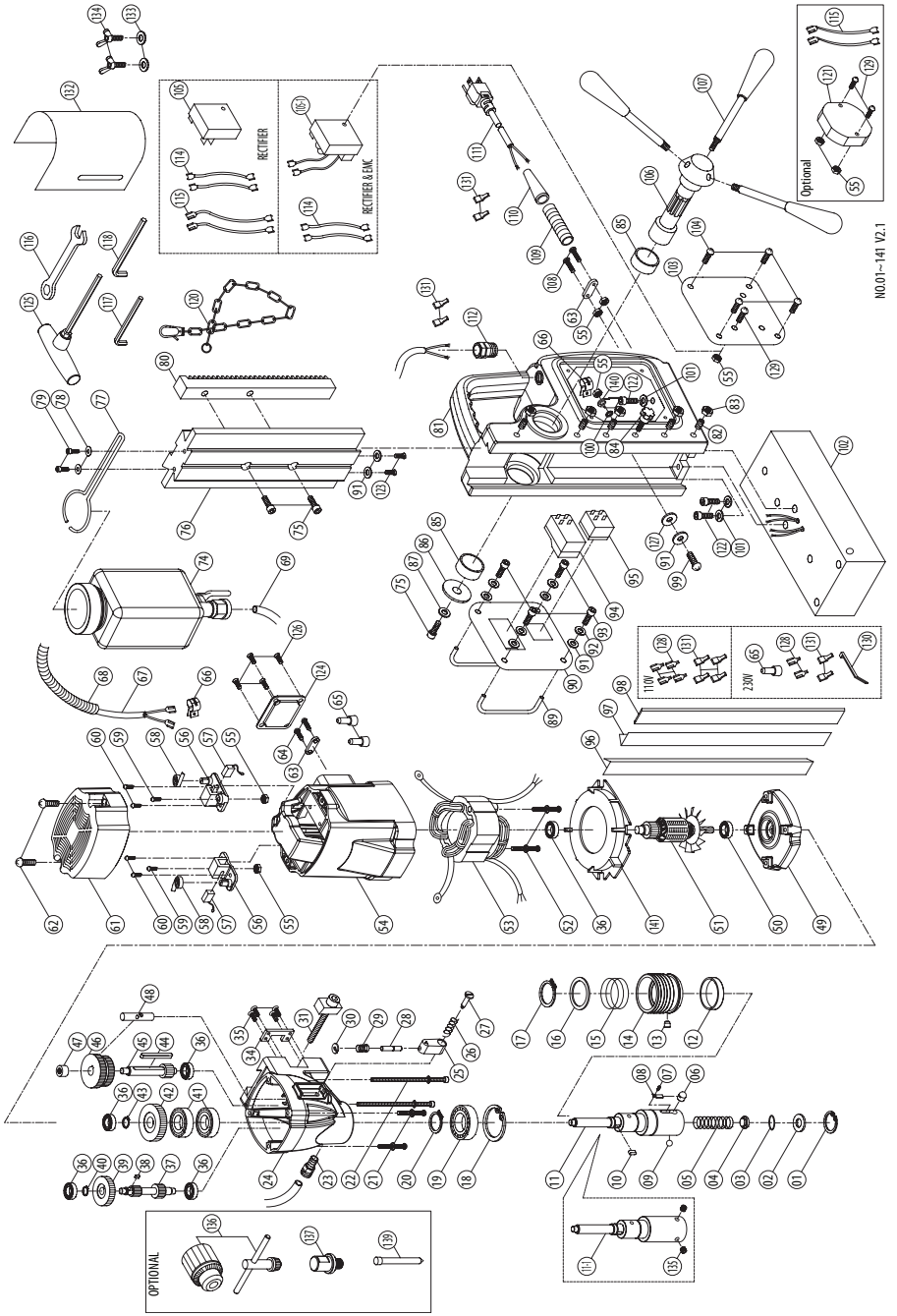
NO.	Parts Name	Q'TY	75	SOCKET CAP SCREW M6 x 16	3
1	INTERNAL CIRCLIP R-19	1	76	SLIDE	1
2	ARBOR WASHER Ø10 x Ø18.5 x 0.8	1	77	COOLANT TANK BRACKET	1
3	O-RING Ø12 x Ø20 x 4	1	78	FLAT WASHER Ø5 x Ø12 x 1	2
4	COOLANT SEAL	1	79	SOCKET CAP SCREW M5 x 16	2
5	SPRING Ø1.2 x Ø10.1 x Ø12.5 x 12T x 90L	1	80	GEAR RACK	1
6	LOCKING PIN 12.3mm	1	81	STAND BODY	1
6	LOCKING PIN 11.7mm	1	82	GIB SET SCREW M5 x 20	5
7	SET SCREW M3 x 4	1	83	GIB LOCK NUT M5	5
8	LOCKING PIN SPRING	1	84	THUMB SCREW M5 x 16	1
9	CHECK BALL Ø8	1	85	BUSHING Ø28 x Ø32 x 12	2
10	PARALLEL KEY 5 x 5 x 10	1	86	FLAT WASHER Ø6 x Ø40 x 2.5	1
11	SPINDLE	1	87	FLAT WASHER Ø6 x Ø25 x 1	1
11-1	SPINDLE	1	88	N/A	-
12	RING Ø40 x Ø44 x 9	1	89	SWITCH GUARD BAR	2
12	RING Ø40 x Ø44 x 9	1	90	SWITCH PANEL	1
13	COLLAR PIN	1	91	FLAT WASHER Ø4 x Ø10 x 1	7
14	QUICK-RELEASE COLLAR	1	92	SPRING WASHER M4	4
15	SPRING Ø2 x Ø39 x Ø43 x 3T x 30L	1	93	SOCKET CAP SCREW M4 x 16	4
16	SPRING SEAT RING Ø35.1 x Ø44.5 x 2	1	94	MOTOR SWITCH	1
17	EXTERNAL CIRCLIP S-35	1	94	MOTOR SWITCH	1
18	INTERNAL CIRCLIP R-47	1	95	MAGNET SWITCH	1
19	BEARING 6005 zz	1	96	GIB STRIP - LEFT	1
20	EXTERNAL CIRCLIP S-25	1	97	GIB STRIP - RIGHT	1
21	SCREW M5 x 65	4	98	GIB TENSIONER 260 x 11 x 2.3	1
22	N/A	-	99	SCREW M4 x 16	1
23	PUSH LOCK FITTING	1	100	STAR WASHER M5	1
24	GEAR CASE	1	101	SPRING WASHER M6	3
25~30	N/A	-	102	MAGNET BASE 164 x 80 x 48	1
31	SLIDE HEIGHT LOCK	1	103	SIDE PANEL	1
32~33	N/A	-	104	SCREW M4 x 8	4
34	LOCK BRACKET	1	105	RECTIFIER	1
35	FLAT HEAD SCREW M4 x 10	4	105-1	RECTIFIER & EMC	1
36	BEARING 608 zz	5	106	CRANK SPINDLE	1
37	INPUT PINION H:M1.0 x 17T	1	107	CRANK LEVER	3
37	INPUT PINION L:M1.0 x 12T	1	108	SCREW M4 x 30	2
38	PARALLEL KEY 4 x 4 x 8	2	109	STRAIN RELIEF 8cm	1
39	INPUT GEAR M1.0 x 36T	1	110	CORD ARMOR	1
40	EXTERNAL CIRCLIP S-10	1	111	POWER SUPPLY CABLE 1.0 x 3C x 2.5M	1
41	OIL SEAL Ø25 x Ø40 x 7	2	112	CABLE GLAND	1
42	OUTPUT GEAR M1.25 x 37T	1	113	N/A	-
43	EXTERNAL CIRCLIP S-15	1	114	LEAD WIRE 18CM	2
44	EXTERNAL CIRCLIP S-12	1	115	LEAD WIRE 18CM	4
45	INTERMEDIATE GEAR PINION M1.25 x 12T	1	116	COMBINATION WRENCH M8	1
46	INTERMEDIATE GEAR H:M1.0 x 40T	1	117	L-HEX KEY M2.5	1
46	INTERMEDIATE GEAR L:M1.0 x 45T	1	118	L-HEX KEY M4	1
47	NEEDLE BEARING HK 0810	1	119	N/A	-
48	N/A	-	120	SAFETY CHAIN	1
49	GEAR PLATE	1	121	OVERLOAD UNIT(OPTIONAL)	1
50	BEARING 6001-LLU	1	121	OVERLOAD UNIT(OPTIONAL)	1
51	ARMATURE 7T	1	122	SOCKET CAP SCREW M6 x 20	3
51	ARMATURE 7T	1	123	TRUSS HEAD SCREW M4 x 6	2
52	SCREW M5 x 60	2	124	MOTOR COVER PLATE	1
53	STATOR	1	125	T-HANDLE HEX KEY M6	1
54	MOTOR HOUSING	1	126	FLAT HEAD SCREW M4 x 8	4
55	NUT M4 x 8	8	127	RUBBER WASHER M4	1
56	BRUSH HOLDER	2	128	SPADE TERMINAL	4
57	CARBON BRUSH 7 x 11 x 17	2	129	SCREW M4 x 25	3
58	BRUSH SPRING	2	130	ZIP TIE	1
59	SCREW M4 x 10	2	131	TERMINAL COVER	8
60	SCREW M4 x 12	4	132	CHIP GUARD	1
61	MOTOR TAIL COVER	1	133	FLAT WASHER Ø6 x Ø13 x 1	2
62	SCREW M4 x 25	2	134	BUTTERFLY SCREW M6 x 10	2
63	CABLE CLIP	2	135	SET SCREW M8 x 7	2
64	SCREW M4 x 14	2	136	CHUCK (OPTIONAL) 1/2"	1
65	END SPLICE TERMINAL C4	3	137	CHUCK ADAPTOR (OPTIONAL) 1/2" 17.4	1
66	CABLE CLAMP	2	138	N/A	-
67	MOTOR CABLE 1.25 x 2C x 65CM	1	139	PILOT PIN (OPTIONAL) HSSx77Lx Ø6.35(steppin)	1
68	CABLE PROTECTOR 40cm	1	140	EARTHING MARKING	1
69	COOLANT TUBE 15cm	1	141	FAN BAFFLE	1
70~73	N/A	-			
74	COOLANT TANK ASSEMBLY	1			

Semi Auto Feed Drilling System Exploded View & Parts list



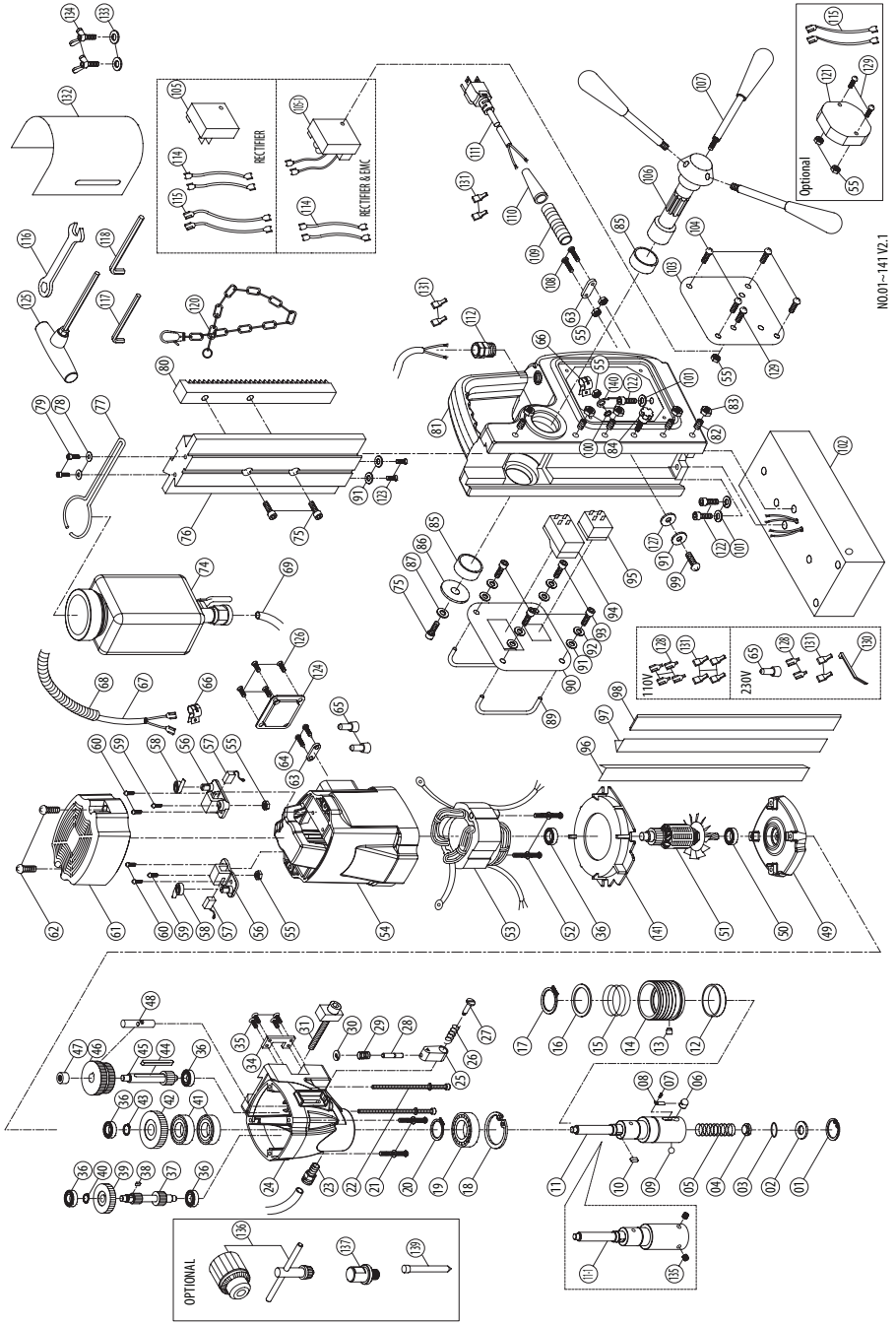
NO.	Parts Name	Q'TY	74	NUT	1
1	SET SCREW M8 x 7	2	75	SELECTOR SWITCH	1
2	ARBOR	1	76	SWITCH GUARD	2
3	ARBOR SUPPORT BRACKET	1	77	MOTOR ON SWITCH (GREEN)	1
4	TRUSS HEAD SCREW M5 x 8	2	78	MOTOR OFF SWITCH (RED)	1
5	SPRING WASHER M8	3	79	NUT M5	6
6	SOCKET CAP BOLT M8 x 55	2	80	SET SCREW M5 x 20	6
7	SOCKET CAP BOLT M8 x 30	1	81	STAR WASHER M5	1
8	SOCKET CAP BOLT M6 x 20	5	82	LIMIT SWITCH	1
9	SPRING WASHER M6	3	83	PIN Ø2.2 x 10	2
10	MAGNET	1	84	GIB TENSIONER 260 x 11 x 2.3	1
11	BEARING HK 3516	1	85	GIB STRIP - RIGHT	1
12	COOLANT SEAL	1	86	GIB STRIP - LEFT 260L	1
13	SPRING	1	87	FEED MOTOR	1
14	SPINDLE	1	88	FEED MOTOR GEAR BOX	1
15	PARALLEL KEY 5 x 5 x 10	1	89	BUSHING Ø8 x Ø12 x 6	2
16	OIL SEAL Ø28 x Ø40 x 7	2	90	FEED INTERMEDIATE GEAR 10T	1
17	SCREW M5 x 70	4	91	PARALLEL KEY 4 x 4 x 10	1
18	PUSH LOCK FITTING	1	92	FEED OUTPUT GEAR 80T	1
19	GEAR CASE	1	93	BEARING 6809 zz	1
20	PARALLEL KEY 4 x 4 x 30	1	94	ENGAGEMENT GEAR 63T	1
21	BEARING 6003 zz	2	95	EXTERNAL CIRCLIP S-29	1
22	INTERNAL CIRCLIP R-35	1	96	FEED SUPPORT BASE	1
23	EXTERNAL CIRCLIP S-17	1	97	FLAT HEAD SCREW M5 x 15	4
24	OUTPUT GEAR 37T	1	98	FLAT HEAD SCREW M5 x 30	4
25	EXTERNAL CIR CLIP S-15	1	99	AUTO FEED COVER	1
26	BEARING 608 zz	6	100	SCREW M5 x 20	5
27	PARALLEL KEY 4 x 4 x 8	2	101	CAPACITOR	1
28	INTERMEDIATE GEAR PINION 12T	1	101	CAPACITOR	1
29	INTERMEDIATE GEAR 34T	1	102	ELECTRONICS BOARD	1
30	EXTERNAL CIRCLIP S-10	2	102	ELECTRONICS BOARD	1
31	INPUT PINION 9T	1	103	SIDE PLATE	1
32	INPUT GEAR 30T	1	104	SCREW M3.5 x 6	4
33	GEAR PLATE	1	105	SCREW M4 x 8	7
34	BEARING 6001-LLU	1	106	SCREW M4 x 30	2
35	ARMATURE 7T	1	107	CABLE PROTECTOR 7CM	1
35	ARMATURE 7T	1	108	CORD ARMOR	1
36	SCREW M5 x 60	2	109	POWER SUPPLY CABLE	1
37	STATOR	1	110	SCREW M4 x 10	1
37	STATOR	1	111	SELECTOR CAM	1
38	MOTOR HOUSING	1	112	BALL Ø5	8
39	NUT M4 x 8	5	113	CRANK SPINDLE	1
40	BRUSH HOLDER 7 x 11	2	114	SELECTOR ROD	1
41	CARBON BRUSH 7 x 11 x 17	2	115	CRANK HUB	1
42	SPRING	2	116	SET SCREW M8 x 10	3
43	SCREW M4 x 10	2	117	DETENT UNIT M6 x 13	3
44	SCREW M4 x 12	4	118	SPRING PIN Ø4.2 x 25	3
45	MOTOR TAIL COVER	1	119	CRANK LEVER TIP	3
46	SCREW M4 x 25	2	120	CRANK LEVER	3
47	CABLE PROTECTOR 40CM	1	121	CRANK GRIP	3
48	MOTOR CABLE 1.25 x 2C x 80CM	1	122	HUB COVER	1
49	CABLE CLAMP	1	123	FLAT WASHER Ø6 x Ø13 x 1	2
50	SCREW M4 x 14	2	124	BUTTERFLY SCREW M6 x 10	2
51	CORD CLIP	2	125	CHIP GUARD	1
52	WIRE CONNECTOR C-4	3	126	SAFETY CHAIN	1
53	GEAR RACK	1	127	COMBINATION WRENCH M8	1
54	SCREW M8 x 16	2	128	L-HEX KEY M2.5	1
55	SLIDE PLATE	1	129	L-HEX KEY M4	1
56	SOCKET CAP BOLT M5 x 16	2	130	SCREW M4 x 16	1
57	FLAT WASHER Ø5 x Ø12 x 1	2	131	SPADE TERMINAL	4
58	COOLANT TANK BRACKET	1	132	RUBBER WASHER Ø4 x Ø11 x 1	1
59	COOLANT TANK ASSEMBLY	1	133	TERMINAL COVER	8
60 ~63	N/A	-	134	ZIP TIE	1
64	COOLANT TUBE 15CM	1	135	HUB PLATE	1
65	CABLE GLAND	1	136	CHUCK ADAPTOR	1
66	BUSHING Ø28 x Ø32 x 12	2	137	CHUCK	1
67	STAND BODY	1	138	CHUCK KEY	1
68	SPEED CONTROL BOARD	1	139	PILOT PIN TCTx91Lx08	1
69	SOCKET CAP SCREW M4 x 16	4	140	SWITCH PROTECTIVE COVER	2
70	SPRING WASHER M4	4	141	EARTHING MARKING	1
71	FLAT WASHER Ø4 x Ø10 x 1	6	142	FAN BAFFLE	1
72	SWITCH PLATE	1			
73	MAGNET SWITCH	1			

2 Speed Drilling System Exploded View & Parts list (High Speed)



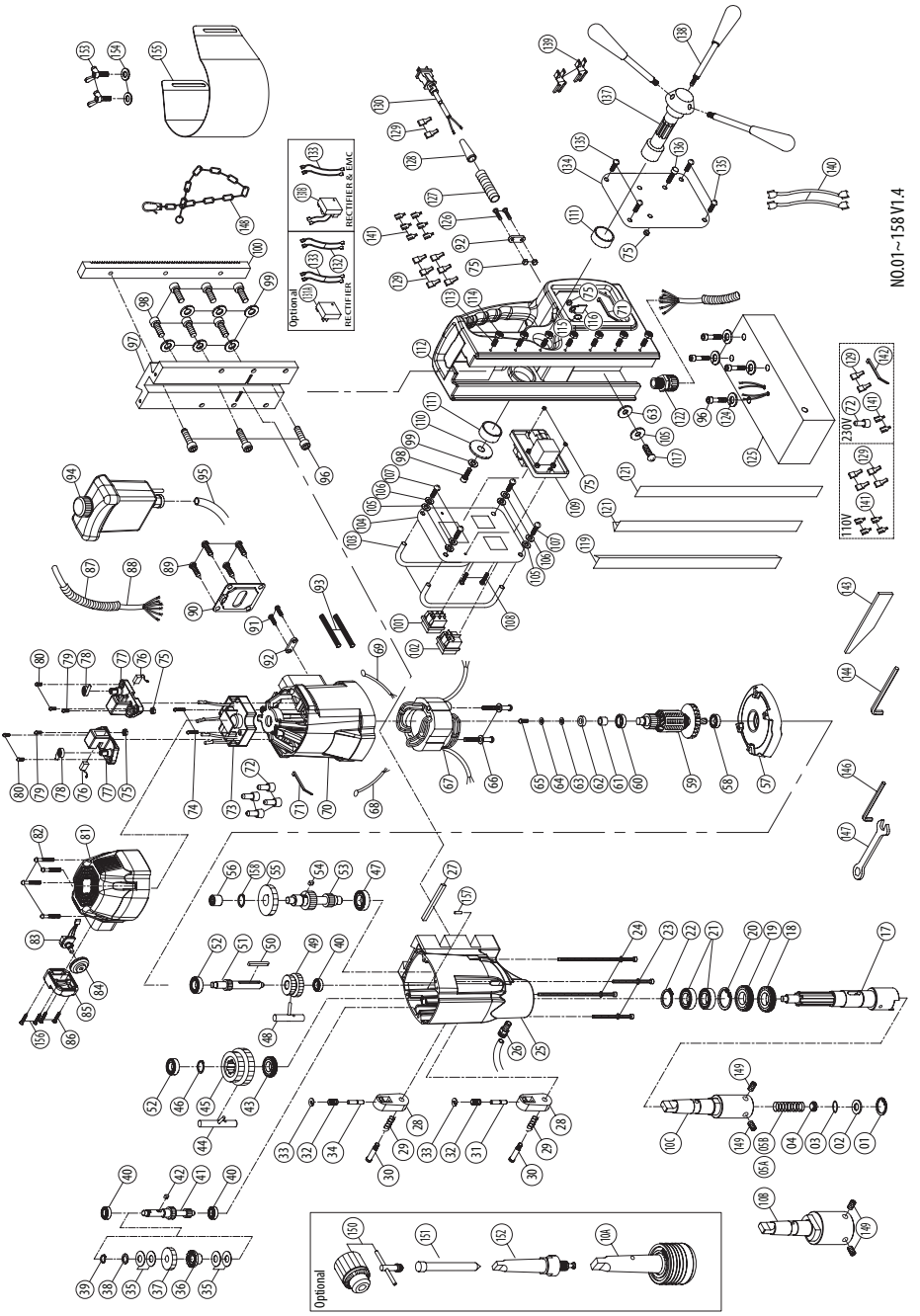
NO.	Parts Name	Q'TY	70 ~73	N/A	-
1	INTERNAL CIRCLIP R-19	1	74.	COOLANT TANK ASSEMBLY	1
2	ARBOR WASHER Ø10 x Ø18.5 x 0.8	1	75	SOCKET CAP BOLT M6 x 16	3
3	O-RING Ø12 x Ø20 x 4	1	76	SLIDE	1
4	COOLANT SEAL	1	77	COOLANT TANK BRACKET	1
5	SPRING Ø1.2 x Ø10.1 x Ø12.5 x 12T x 90L	1	78	FLAT WASHER Ø5 x Ø12 x 1	2
6	LOCKING PIN 12.3mm	1	79	SOCKET CAP SCREWM5 x 16	2
6	LOCKING PIN 11.7mm	1	80	GEAR RACK	1
7	SCREW M3 x 4	1	81	STAND BODY	1
8.	LOCKING PIN SPRING	1	82	GIB SET SCREW M5 x 20	5
9	CHECK BALL Ø8	1	83	GIB LOCK NUT M5	5
10	PARALLEL KEY 5 x 5 x 10	1	84	THUMB SCREW M5 x 16	1
11	SPINDLE	1	85	BUSHING Ø28 x Ø32 x 12	2
11-1	SPINDLE	1	86	FLAT WASHER Ø6 x Ø40 x 2.5	1
12	RING Ø40 x Ø44 x 9	1	87	FLAT WASHER Ø6 x Ø25 x 1	1
13	COLLAR PIN	1	88	N/A	-
14	QUICK-RELEASE COLLAR	1	89	SWITCH GUARD BAR	2
15	SPRING Ø2 x Ø39 x Ø43 x 3T x 30L	1	90	SWITCH PANEL	1
16	SPRING SEAT RING Ø35.1 x Ø44.5 x 2	1	91	FLAT WASHER Ø4 x Ø10 x 1	7
17	EXTERNAL CIRCLIP S-35	1	92	SPRING WASHER M4	4
18	INTERNAL CIRCLIP R-47	1	93	SOCKET CAP SCREW M4 x 16	4
19	BEARING 6005 zz	1	94	MOTOR SWITCH	1
20	EXTERNAL CIRCLIP S-25	1	95	MAGNET SWITCH	1
21	SCREW M5 x 65	2	96	GIB STRIP - LEFT	1
22	SCREW M5 x 110	2	97	GIB STRIP - RIGHT	1
23	PUSH LOCK FITTING	1	98	GIB TENSIONER 260 x 11 x 2.3	1
24	GEAR CASE	1	99	SCREW M4 x 16	1
25	SELECTOR TAB	1	100	STAR WASHER M5	1
26	SPRING Ø1 x Ø9 x Ø11 x 4T x 10.5L	1	101	SPRING WASHER M6	3
27	SHOULDER SCREW	1	102	MAGNET BASE	1
28	DETENT PIN	1	103	SIDE PANEL	1
29	SPRING Ø0.6 x Ø5.3 x Ø6.5 x 5T x 17L	1	104	SCREW M4 x 8	4
30	E-CLIP E-3	1	105	RECTIFIER	1
31	SLIDE HEIGHT LOCK	1	105-1	RECTIFIER & EMC	1
32	N/A	-	106	CRANK SPINDLE	1
33	N/A	-	107	CRANK LEVER	3
34	LOCK BRACKET	1	108	SCREW M4 x 30	2
35	FLAT HEAD SCREW M4 x 10	4	109	STRAIN RELIEF 7cm	1
36	BEARING 608 zz	5	110	CORD ARMOR	1
37	INPUT PINION M1.0 x 12T & 17T	1	111	POWER SUPPLY CABLE 1.0 x 3C x 2.5M	1
38	PARALLEL KEY 4 x 4 x 8	1	112	CABLE GLAND	1
39	INPUT GEAR M1.0 x 36T	1	113	N/A	-
40	EXTERNAL CIRCLIP S-10	1	114	LEAD WIRE 18CM	2
41	OIL SEAL Ø25 x Ø40 x 7	2	115	LEAD WIRE 18CM	4
42	OUTPUT GEAR M1.25 x 37T	1	116	COMBINATION WRENCH M8	1
43	EXTERNAL CIRCLIP S-15	1	117	L-HEX KEY M2.5	1
44	PARALLEL KEY M5 x 5 x 50	1	118	L-HEX KEY M4	1
45	INTERMEDIATE GEAR PINION M1.25 x 12T	1	119	N/A	-
46	INTERMEDIATE GEAR M1.0 x 45T & 40T	1	120	SAFETY CHAIN	1
47	NEEDLE BEARING HK 0810	1	121	OVERLOAD UNIT(OPTIONAL)	1
48	SELECTOR FORK	1	122	SOCKET CAP BOLT M6 x 20	3
49	GEAR PLATE	1	123	TRUSS HEAD SCREW M4 x 6	2
50	BEARING 6001-LLU	1	124	MOTOR COVER PLATE	1
51	ARMATURE 7T	1	125	T-HANDLE HEX KEY M6	1
52	SCREW M5 x 60	2	126	FLAT HEAD SCREW M4 x 8	4
53	STATOR	1	127	RUBBER WASHER M4	1
54	MOTOR HOUSING	1	128	TERMINAL	4
55	NUT M4 x 8	8	129	SPADE TERMINAL M4 x 25	3
56	BRUSH HOLDER	2	130	ZIP TIE	1
57	CARBON BRUSH 7 x 11 x 17	2	131	TERMINAL COVER	8
58	BRUSH SPRING	2	132	CHIP GUARD	1
59	SCREW M4 x 10	2	133	FLAT WASHER Ø6 x Ø13 x 1	2
60	SCREW M4 x 12	4	134	BUTTERFLY SCREW M6 x 10	2
61	MOTOR TAIL COVER	1	135	SET SCREW M8 x 7	2
62	SCREW M4 x 25	2	136	CHUCK (OPTIONAL) 1/2"	1
63	CABLE CLIP	2	137	CHUCK ADAPTOR (OPTIONAL) 1/2"	1
64	SCREW M4 x 14	2	138	N/A	-
65	END SPLICE TERMINAL C4	3	139	PILOT PIN (OPTIONAL) HSSx77Lxφ6.35(steppin)	1
66	CABLE CLAMP	2	140	EARTHING MARKING	1
67	MOTOR CABLE 1.25 x 2C x 65CM	1	141	FAN BAFFLE	1
68	CABLE PROTECTOR 40cm	1			
69	COOLANT TUBE 15cm	1			

2 Speed Drilling System Exploded View & Parts list (Low Speed)



NO.	Parts Name	Q'TY	74	COOLANT TANK ASSEMBLY	1
1	INTERNAL CIRCLIP R-19	1	75	SOCKET CAP BOLT M6 x 16	3
2	ARBOR WASHER Ø10 x Ø18.5 x 0.8	1	76	SLIDE	1
3	O-RING Ø12 x Ø20 x 4	1	77	COOLANT TANK BRACKET	1
4	COOLANT SEAL	1	78	FLAT WASHER Ø5 x Ø12 x 1	2
5	SPRING Ø1.2 x Ø10.1 x Ø12.5 x 12T x 90L	1	79	SOCKET CAP SCREW M5 x 16	2
6	LOCKING PIN 12.3mm	1	80	GEAR RACK	1
6	LOCKING PIN 11.7mm	1	81	STAND BODY	1
7	SCREW M3 x 4	1	82	GIB SET SCREW M5 x 20	5
8	LOCKING PIN SPRING	1	83	GIB LOCK NUT M5	5
9	CHECK BALL Ø8	1	84	THUMB SCREW M5 x 16	1
10	PARALLEL KEY 5 x 5 x 10	1	85	BUSHING Ø28 x Ø32 x 12	2
11	SPINDLE	1	86	FLAT WASHER Ø6 x Ø40 x 2.5	1
11-1	SPINDLE	1	87	FLAT WASHER Ø6 x Ø25 x 1	1
12	RING Ø40 x Ø44 x 9	1	88	N/A	-
13	COLLAR PIN	1	89	SWITCH GUARD BAR	2
14	QUICK-RELEASE COLLAR	1	90	SWITCH PANEL	1
15	SPRING Ø2 x Ø39 x Ø43 x 3T x 30L	1	91	FLAT WASHER Ø4 x Ø10 x 1	7
16	SPRING SEAT RING Ø35.1 x Ø44.5 x 2	1	92	SPRING WASHER M4	4
17	EXTERNAL CIRCLIP S-35	1	93	SOCKET CAP SCREW M4 x 16	4
18	INTERNAL CIRCLIP R-47	1	94	MOTOR SWITCH	1
19	BEARING 6005 zz	1	95	MAGNET SWITCH	1
20	EXTERNAL CIRCLIP S-25	1	96	GIB STRIP - LEFT	1
21	SCREW M5 x 65	2	97	GIB STRIP - RIGHT	1
22	SCREW M5 x 110	2	98	GIB TENSIONER 260 x 11 x 2.3	1
23	PUSH LOCK FITTING	1	99	SCREW M4 x 16	1
24	GEAR CASE	1	100	STAR WASHER M5	1
25	SELECTOR TAB	1	101	SPRING WASHER M6	3
26	SPRING Ø1 x Ø9 x Ø11 x 4T x 10.5L	1	102	MAGNET BASE	1
27	SHOULDER SCREW	1	103	SIDE PANEL	1
28	DETENT PIN	1	104	SCREW M4 x 8	4
29	SPRING Ø5.3 x Ø6.5 x 5T x 17L	1	105	RECTIFIER	1
30	E-CLIP E-3	1	105-1	RECTIFIER & EMC	1
31	SLIDE HEIGHT LOCK	1	106	CRANK SPINDLE	1
32~33	N/A	-	107	CRANK LEVER	3
34	LOCK BRACKET	1	108	SCREW M4 x 30	2
35	FLAT HEAD SCREW M4 x 10	4	109	STRAIN RELIEF 7cm	1
36	BEARING 608 zz	5	110	CORD ARMOR	1
37	INPUT PINION M1.0 x 11T & 15T	1	111	POWER SUPPLY CABLE 1.0 x 3C x 2.5M	1
38	PARALLEL KEY 4 x 4 x 8	1	112	CABLE GLAND	1
39	INPUT GEAR M1.0 x 36T	1	113	N/A	-
40	EXTERNAL CIRCLIP S-10	1	114	LEAD WIRE 18CM	2
41	OIL SEAL Ø25 x Ø40 x 7	2	115	LEAD WIRE 18CM	4
42	OUTPUT GEAR M1.25 x 39T	1	116	COMBINATION WRENCH M8	1
43	EXTERNAL CIRCLIP S-15	1	117	L-HEX KEY M2.5	1
44	PARALLEL KEY M5 x 5 x 50	1	118	L-HEX KEY M4	1
45	INTERMEDIATE GEAR PINION M1.25 x 10T	1	119	N/A	-
46	INTERMEDIATE GEAR M1.0 x 46T & 42T	1	120	SAFETY CHAIN	1
47	NEEDLE BEARING HK 0810	1	121	OVERLOAD UNIT(OPTIONAL)	1
48	SELECTOR FORK	1	122	SOCKET CAP BOLT M6 x 20	3
49	GEAR PLATE	1	123	TRUSS HEAD SCREW M4 x 6	2
50	BEARING 6001-LLU	1	124	MOTOR COVER PLATE	1
51	ARMATURE 7T	1	125	T-HANDLE HEX KEY M6	1
52	SCREW M5 x 60	2	126	FLAT HEAD SCREW M4 x 8	4
53	STATOR	1	127	RUBBER WASHER M4	1
54	MOTOR HOUSING	1	128	SPADE TERMINAL	4
55	NUT M4 x 8	8	129	SCREW M4 x 25	3
56	BRUSH HOLDER	2	130	ZIP TIE	1
57	CARBON BRUSH 7 x 11 x 17	2	131	TERMINAL COVER	8
58	BRUSH SPRING	2	132	CHIP GUARD	1
59	SCREW M4 x 10	2	133	FLAT WASHER Ø6 x Ø13 x 1	2
60	SCREW M4 x 12	4	134	BUTTERFLY SCREW M6 x 10	2
61	MOTOR TAIL COVER	1	135	SET SCREW M8 x 7	2
62	SCREW M4 x 25	2	136	CHUCK (OPTIONAL) 1/2"	1
63	CABLE CLIP	2	137	CHUCK ADAPTOR (OPTIONAL) 1/2"	1
64	SCREW M4 x 14	2	138	N/A	-
65	END SPLICE TERMINAL C4	3	139	PILOT PIN (OPTIONAL) HSSx77Lx Ø6.35(steppin)	1
66	CABLE CLAMP	2	140	EARTHING MARKING	1
67	MOTOR CABLE 1.25 x 2C x 65CM	1	141	FAN BAFFLE	1
68	CABLE PROTECTOR 40cm	1			
69	COOLANT TUBE 15cm	1			
70~73	N/A	-			

4 Speed Variable Motor Speed Drilling System Exploded View & Parts List



NO.	Parts Name	Q'TY	NO.	Parts Name	Q'TY
1	INTERNAL CIRCLIP R-19	1	83	RHEOSTAT	1
2	ARBOR WASHER Ø10 x Ø18.5 x 0.8	1	84	THUMB WHEEL	1
3	O-RING 12 x 4	1	85	SPEED ADJUSTOR COVER	1
4	COOLANT SEAL Ø12 x Ø10.2 x 15	1	86	FLAT HEAD SCREW M4 x 16	2
5A	SPRING-for 10B.) Ø1.2 x Ø10.1 x Ø12.5 x 15T x 100L	1	87	CABLE PROTECTOR 65cm	1
5B	SPRING-for 10C.) Ø1.2 x Ø10 x Ø12.4 x 24T x 140L	1	88	MOTOR CABLE 90cm	1
6~9	N/A	-	89	SCREW M5 x 10	4
10A	3/4" QUICK-RELEASE ARBOR-MT3 MT3(LOCKING PIN 12.3mm,11.7mm)	1	90	COVER PLATE	1
10B	1-1/4" CUTTER ARBOR-MT3 31.7mm	1	91	SCREW M4 x 16	2
10C	3/4" CUTTER ARBOR-MT3 19MM	1	92	CORD CLIP	2
11~15	N/A	-	93	CABLE SHEATH M4 x 12CM	2
16	EXTERNAL CIRCLIP S-35	1	94	COOLANT TANK ASSEMBLY	1
17	SPINDLE	1	95	COOLANT TUBE 40cm	1
18	OIL SEAL Ø40 x Ø58 x 8	1	96	SOCKET CAP BOLT M8 x 20	7
19	OIL SEAL Ø40 x Ø55 x 7	1	97	SLIDE	1
20	INTERNAL CIRCLIP R-55	1	98	SOCKET CAP BOLT M8 x 16	7
21	BALL BEARING 6006-LLB	2	99	SPRING WASHER M8	7
22	EXTERNAL CIRCLIP S-30	1	100	GEAR RACK 270cm	1
23	SCREW M5 x 80	2	101	REVERSING SWITCH	1
24	SCREW M5 x 150	2	102	MAGNET SWITCH	1
25	GEAR CASE	1	103	GUARD BAR	2
26	PUSH LOCK FITTING	1	104	SWITCH PANEL	1
27	MOUNTING TENON M4 x 4 x 60	1	105	FLAT WASHER Ø4 x Ø10 x 1	5
28	SELECTOR TAB	2	106	SPRING WASHER M4	4
29	SPRING Ø1 x Ø9 x Ø11 x 4T	2	107	SOCKET CAP BOLT M4 x 16	4
30	SHOULDER SCREW	2	108	SCREW M4 x 20	2
31	DETENT PIN	1	109	MOTOR SWITCH	1
32	SPRING Ø0.6 x Ø5.3 x Ø6.5 x 5T x 17L	2	110	FLAT WASHER Ø8 x Ø40 x 2.5	1
33	E-CLIP E-3	2	111	CRANK BUSHING Ø32 x Ø38 x 12	2
34	DETENT PIN	1	112	STAND BODY	1
35	DISC SPRING Ø12.4 x Ø27.9	4	113	SET SCREW M5 x 35	7
36	TOOTH CLUTCH	1	114	NUT M5	7
37	CLUTCH GEAR	1	115	STAR WASHER M5	1
38	THRUST WASHER Ø12.1 x Ø18 x 1.6	1	116	EARTHING MARKING	1
39	EXTERNAL CIRCLIP E-10	1	117	SCREW M4 x 16	1
40	BALL BEARING 608 zz	3	118	N/A	-
41	INPUT PINION M1.25 x 15T & 10T	1	119	GIB STRIP-LEFT 394mm	1
42	PARALLEL KEY M5 x 5 x 10	1	120	GIB STRIP-RIGHT 394mm	1
43	OIL SEAL Ø28 x Ø38 x 7	1	121	GIB STRIP TENSIONER 394 x 15 x 1.2	1
44	FIRST SELECTOR FORK	1	122	CABLE GLAND	1
45	SPINDLE GEAR M1.75 x 27T M2.0 x 29T	1	123	N/A	-
46	INTERNAL CIRCLIP S-25	1	124	SPRING WASHER M6	4
47	BALL BEARING 6202 zz ZZ	1	125	MAGNET BASE	1
48	SECOND SELECTOR FORK	1	126	SCREW M4 x 30	2
49	INTERMEDIATE GEAR M1.25 x 27T & 32T	1	127	STRAIN RELIEF 7CM	1
50	PARALLEL KEY 5 x 5 x 45	1	128	CORD ARMOR	1
51	COUNTERSHAFT PINION 12T	1	129	TERMINAL COVER	12
52	BALL BEARING 6200 zz ZZ	2	130	POWER SUPPLY CABLE	1
53	IDLER PINION M1.75 x 17T M2.0 x 9T	1	131A	RECTIFIER & EMC(OPTIONAL)	1
54	PARALLEL KEY M5 x 5 x 8	1	131B	RECTIFIER & EMC(OPTIONAL)	1
55	IDLER GEAR M1.25 x 43T	1	131B	RECTIFIER & EMC(OPTIONAL)	1
56	NEEDLE BEARING TLA 1212	1	132	WIRE LEADS	2
57	GEAR PLATE	1	133	WIRE LEADS(OPTIONAL) 1015-16#18CM	2
58	BALL BEARING 6202-2NSE	1	134	SIDE COVER	1
59	ARMATURE	1	135	SCREW M4 x 8	4
60	BALL BEARING 6200-LLU	1	136	SCREW M4 x 25	1
61	SPACER Ø8 x Ø12 x 10.5	1	137	CRANK PINION	1
62	PICKUP MAGNET Ø8 x Ø15 x 5	1	138	CRANK HANDLE	3
63	PLASTIC WASHER Ø4 x Ø11 x 1	2	139	3 WAY CONNECTOR	2
64	FLAT WASHER Ø4 x Ø10 x 1	1	140	WIRE LEADS	2
65	SCREW M4 x 10	1	141	SPADE TERMINAL	10
66	SCREW M5 x 60	2	142	ZIP TIE	1
67	STATOR	1	143	DRIFT	1
68	WIRE LEADS	1	144	L HEX KEY(OPTIONAL) 5mm M5	1
69	WIRE LEADS	1	145	N/A	-
70	MOTOR HOUSING	1	146	L HEX KEY 2.5mm M2.5	1
71	ZIP TIE 2.5mmX160mm	2	147	M8 COMBINATION WRENCH M8	1
72	END SPLICE CONNECTOR C4	5	148	SAFETY CHAIN	1
73	ELECTRONICS UNIT(110V,220V)	1	149	SOCKET SET SCREW M10 x 10	2
74	SCREW M4 x 25	2	150	CHUCK(OPTIONAL) 5/8"	1
75	NUT M4 x 8	8	151	PILOT PIN(OPTIONAL) TCTx112Lx08	1
76	CARBON BRUSH 7 x 17 x 17	2	152	MT3 CHUCK ADAPTOR(OPTIONAL)	1
77	BRUSH HOLDER 7 x 17 x 17	2	153	BUTTERFLY BOLT M6 x 10	2
78	BRUSH SPRING	2	154	FLAT WASHER Ø6 x Ø13 x 1	2
79	SCREW M4 x 10	2	155	CHIP GUARD	1
80	SCREW M4 x 12	4	156	FLAT HEAD SCREW M4 x 20	2
81	MOTOR TAIL COVER	1	157	PIN Ø5 x 10	1
82	SCREW M4 x 30	4	158	INTERNAL CIRCLIP S-20	1