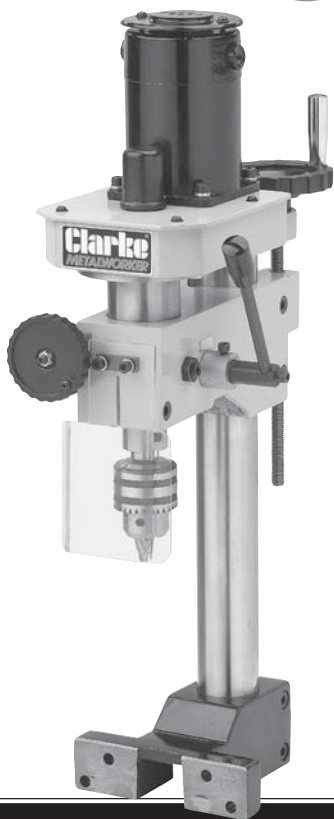


ClarkeTM

METALWORKER



MILLING/DRILLING ATTACHMENT

Model No. CL251MH

Part No. 7610741

OPERATING & MAINTENANCE INSTRUCTIONS



0803

DECLARATION OF CONFORMITY

We declare that this product complies with the following standards/directives:

- **98/37/EEC**
- **89/336/EEC**
- **EN 60 335 - 1**
- **EN 292-2**

Description: **MILLING & DRILLING MACHINE**

Model No: **CL251MH**

Serial (Batch) No: **See Product Date Plate**

Signed: 

DOC No. HO75/27

Clarke International is a trading style of Clarke International Limited

SPECIFICATIONS

| | |
|------------------------------------|---------------|
| Motor | 230V 50Hz 1ph |
| Power Rating | 150W |
| Spindle Taper | MT2 |
| Spindle Speed | 10-1300RPM |
| Max. Spindle Travel | 30mm |
| Max. Dist. Chuck to Table | 168mm |
| Dist. Column to Chuck Centre | 105mm |
| Overall Dimensions (WxDxH) | 220x410x575mm |
| Weight net | 18kg |



Thank you for purchasing this CLARKE - Micro Milling and Drilling machine attachment, designed for use with model CL250M Variable Speed Metal Lathe

Before attempting to operate the machine, please read this instruction manual thoroughly, and follow all directions carefully. By doing so you will ensure the safety of both yourself and others around you, and at the same time, you should look forward to the Press giving you long and trouble free service.

GUARANTEE

This product is guaranteed against faults in manufacture for 12 months from date of purchase. Please keep your receipt as proof of purchase.

This guarantee is invalid if the product has been found to have been abused or tampered with in any way, or not used for the purpose for which it was intended. The reason for return must be clearly stated.

This guarantee does not affect your statutory rights.

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GENERAL SAFETY PRECAUTIONS

FOR OPERATING MACHINERY

WARNING

As with all machinery, there are certain hazards involved with their operation and use. Exercising respect and caution will considerably lessen the risk of personal injury. However, if normal safety precautions are overlooked, or ignored, personal injury to the operator, or damage to property may result.

1. **KNOW YOUR MACHINE.** Read the manual carefully. Learn the machines applications and limitations, as well as the specific potential hazards peculiar to it.
2. **KEEP GUARDS IN PLACE** and in working order.
3. **EARTH ALL MACHINES.** If the machine is equipped with three-pin plug, it should be plugged into a three-pin electrical socket. Never remove the earth pin.
4. **REMOVE ALL ADJUSTING KEYS AND WRENCHES.** Before starting, form the habit of checking to ensure that keys, wrenches and tools are removed from the machine.
5. **KEEP WORK AREA CLEAN.** Cluttered areas and benches invite accidents.
6. **DON'T USE IN DANGEROUS ENVIRONMENT.** Don't use machinery in damp or wet locations, or expose them to rain. Keep work area well lit.
7. **MAKE WORKSHOP CHILDPROOF** - with padlocks, master switches or by removing starter keys.
8. **KEEP CHILDREN AND VISITORS AWAY.** All children and visitors should be kept a safe distance from work area
9. **DON'T FORCE THE MACHINE.** It will do the job better and safer, at the rate for which it was designed.
10. **USE THE RIGHT TOOL.** Don't force a tool or attachment to do a job for which it was not designed.
11. **WEAR PROPER APPAREL.** Loose clothing, gloves, neckties, rings, bracelets, or other jewellery may get caught in moving parts. Nonslip footwear is recommended. Long hair should be contained.
12. **USE SAFETY GLASSES.** Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.
13. **USE EAR DEFENDERS.**
14. **DON'T OVERREACH.** Keep proper footing and balance at all times.
15. **MAINTAIN TOOLS IN TOP CONDITION.** Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.
16. **ALWAYS DISCONNECT THE MACHINE** before servicing or changing accessories.
17. **AVOID ACCIDENTAL STARTING.** Ensure machine is switched OFF before plugging in.
18. **CHECK FOR DAMAGE.** If part of the machine (eg. A cover or guard), is damaged, it should be carefully inspected to ensure that it can perform its' intended function correctly. If in doubt, the part should be renewed. Damage to moving parts or major components should be Inspected by a qualified technician before operating the machine. Contact your local dealer for advice.

19. DO NOT STAND ON THE MACHINE. Serious injury could occur if the machine is tipped over. Do not store materials above or near the machine such that it is necessary to stand on the machine to get to them.
20. NEVER operate a machine when under the influence of alcohol, drugs or medication.
21. ALWAYS ENSURE THAT ADEQUATE LIGHTING is available. A minimum intensity of 300 lux should be provided. Ensure that lighting is placed so that you will not be working in your own shadow.

ADDITIONAL SAFETY RULES FOR DRILL/MILL HEADS

WARNING!

THIS MACHINE MUST NOT BE MODIFIED, OR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS DESIGNED.

1. **IMPORTANT:** You should not operate this machine unless you are thoroughly familiar with drilling machines and drilling techniques. If there is any doubt whatsoever, you should consult a qualified person.
2. Do not operate the machine until it is completely assembled, and you have read, and understood this entire manual
3. Before switching the machine ON, **ALWAYS:-**
 - a. Ensure all chuck keys, spanners and wrenches are removed from the machine.
 - b. Examine the setup carefully, ensuring that the workpiece is perfectly secure.
 - c. Ensure your clothing is properly adjusted.
 - d. Make all adjustments with the power OFF.
5. Always use the correct milling/drilling speeds for the mill/drill size, and the type of material being worked (see page 11).
7. NEVER leave the machine unattended whilst it is running. Turn it OFF and do not leave until it has come to a complete stop.
8. When you have finished with the machine, always remove and store the mill/drill bits.
9. ALWAYS use clamps, or a vise bolted to the Cross-Slide, to hold the work. It must NEVER be held in bare hands.

ELECTRICAL CONNECTIONS



WARNING! THIS APPLIANCE MUST BE EARTHED

The machine is fitted with a power cable with a plug attached. The plug should be connected to the socket at the rear of the Headstock of the CL250M Lathe.

IMPORTANT!

This appliance is fitted with a plug which is moulded on to the electric cable (i.e. non-rewirable) please note:

The plug must be thrown away if it is cut from the electric cable. There is a danger of electric shock if it is subsequently inserted into a socket outlet.

If the plug is damaged, a replacement cable complete with plug must be fitted. These are available from your Clarke dealer (see parts list).

It will be necessary to disassemble the motor in order to fit the replacement cable. Please note that the wires in the mains lead are coloured in accordance with the following code;

| | | |
|----------------|---|---------|
| Green & Yellow | - | Earth |
| Blue | - | Neutral |
| Brown | - | Live |

WARNING!

DO NOT attempt to fit a replacement cable unless you are fully familiar with electrical systems. Consult a qualified technician, or your nearest Clarke dealer.

PREPARATION

On receipt, carefully unpack the components, ensuring that no damage was suffered in transit, and that all parts are accounted for.

The following loose items are to be found in the packing case.

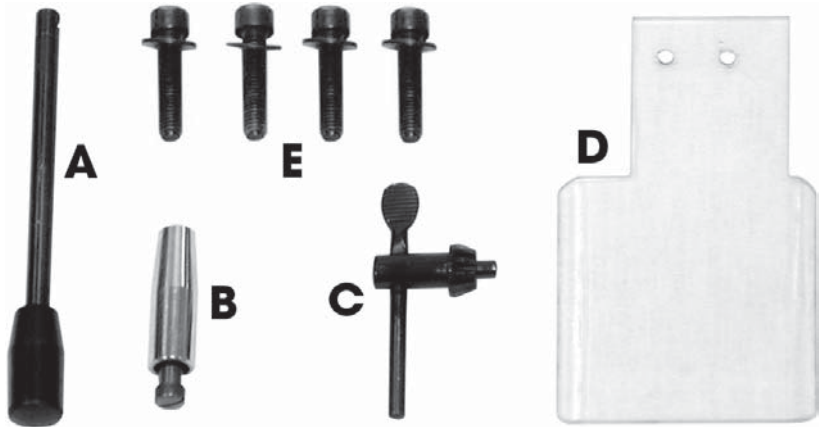


Fig. 1

- A. Spindle Lowering Lever.
- B. Handle.
- C. Chuck Key.
- D. Plastic Guard.
- E. Mounting Bolts w/washers

Check the parts off against the above list.

Should there be any deficiencies or damage, you should contact your CLARKE dealer immediately .

Remove all traces of preservative from the Mill/Drill with a good quality solvent, and wipe all parts thoroughly with a clean dry cloth. Apply a coating of wax paste or light oil, to the untreated parts.

In addition to the above, a Drill Chuck is fitted to the spindle. See Accessories for method of attachment and removal.

Take the necessary precautions when lifting the head assembly, considering its weight. Assistance may be required.

Before use, the machine must be mounted on to the Variable Speed Metal Lathe, Model CL250M.

Ensure the location is adequately lit, and that you will not be working in your own shadow.



ASSEMBLY

Ensure the power supply to the lathe is disconnected.

If any accessories are attached to the cross slide of the lathe, they must be removed before fitting the Mill/Drill Head.

Slacken the Tailstock securing bolts and slide it to the end of the bed and secure in this position.

Bolt the Mill/Drill to the Metal Lathe as shown in Fig. 2, using the four hex. socket head bolts supplied, ensuring they are tight.

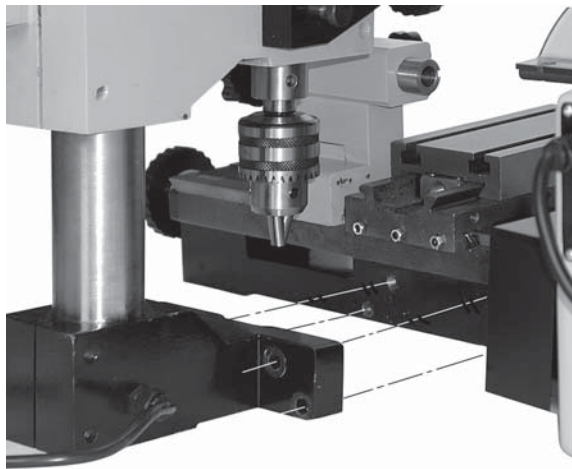


Fig. 2

Attach the Head Control Wheel Handle, 'A', and the Spindle Lowering Lever, 'B', securing the latter with the single screw, provided.

Finally bolt on the plastic guard, 'C' ensuring the metal block (arrowed) is between the head and the guard, tightening the two securing screws using the hex key provided, (with the lathe).

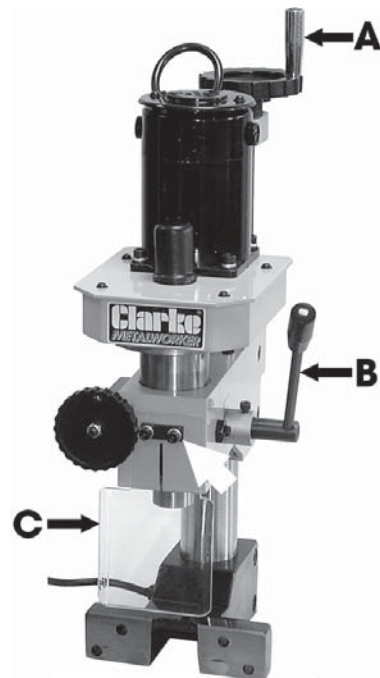


Fig. 3

Finally, plug the Power Cable into the socket on the rear of the Lathe Headstock.

OPERATION.

In order to carry out milling or drilling operations, it will be necessary to provide some means of securing the workpiece.

A quick action vise is available as an accessory from your Clarke dealer. The vise should be secured to the Cross Slide, using the two Tee bolts with nuts and washers provided with the vise, as shown in Fig. 4.

Similarly, a means of holding and securing a Mill or Drill bit is required.

A Collet set and a Mill Chuck set are available for this purpose, from your Clarke dealer.

A set of End Mills is also available with sizes ranging from 3 -10mm.

Please refer to the 'Accessories' section for an explanation as to how to mount and use these tools.

With the workpiece secured to the lathes' Cross Slide (in a vise or otherwise), use the Cross Slide and Saddle feed handles of the lathe to position it beneath the Mill or Drill.

The Mill Head complete is raised or lowered using the handwheel 'A', Fig 5.

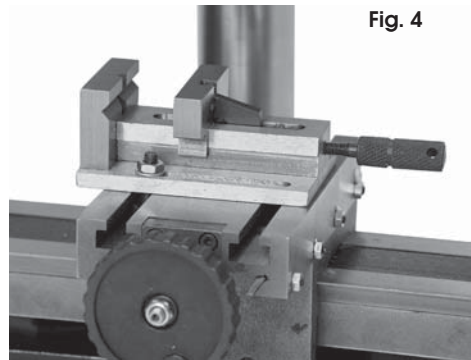


Fig. 4

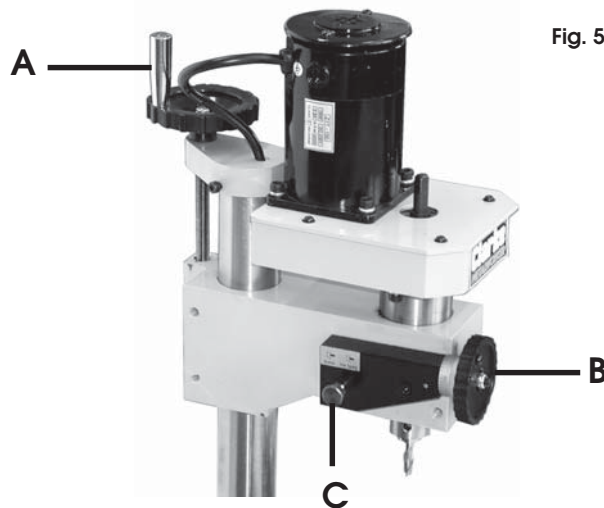


Fig. 5

The maximum spindle travel using the raising and lowering lever is 30mm.

Milling with Accuracy

Milling, with accuracy, to a specific depth, may be achieved using the handwheel 'B' in conjunction with the button 'C'.

1. Push IN and hold button 'C' whilst lowering the Spindle, using the Spindle Lowering Lever, until the button moves inwards, thereby locking the spindle to the mechanism controlled by handwheel 'B'.

2. Lower the Head complete, using Handwheel 'A', until the Mill is a few millimetres from the workpiece.
3. Turn the handwheel 'B' clockwise until the Mill just comes into contact with the workpiece, then very carefully zero the scale by holding the handwheel steady and turning the scale independently so that the '0' lines up with the mark provided on the head.

The machine is now set and prepared for accurate Milling to a specific depth.

Switch ON the Mill (refer to the 'Starting' procedure in the Lathe manual).

Turn the handwheel 'B' clockwise, observing the scale.....one graduation is equivalent to 1mm in depth.

It is important to set the spindle speed correctly, according to the job in hand. A knowledge of Cutting Speeds is therefore necessary.

It is not intended for this booklet to be a tutorial on Milling and Drilling procedures It is strongly recommended therefore that you consult a suitable reference book on the subject. Nevertheless, a brief summary is given below as a basis on which to begin.

Accurate Drilling

Drilling accurately to a predetermined depth is possible using the Spindle Lowering lever. A scale shown in Fig.6 is provided, one division of which is equivalent to 1mm in depth.

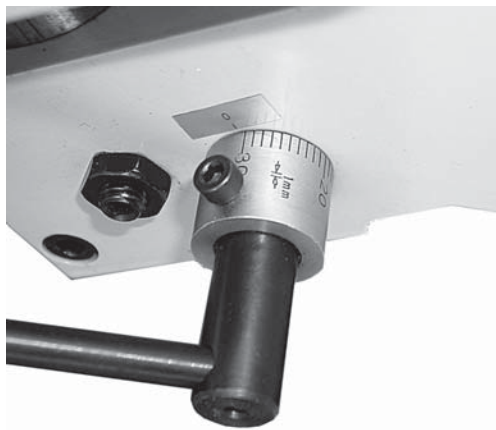


Fig. 6

Bring the drill so that it is just in contact with the workpiece using the **HEAD** Lowering handle. Slacken the screw securing the scale and turn it the required number of divisions, corresponding to the depth of desired cut, and secure in this position. i.e if the drilling depth is 15mm, the 15th division mark should be opposite the zero mark on the body.

The Spindle lowering lever may now be turned to the required depth for repetitive drilling if desired.

MAINTENANCE

For maximum performance, it is essential that the Drill Press is properly maintained. Always inspect before use. Any damage should be repaired, and maladjustments rectified.

If you are unable to rectify any faults, please contact your local dealer or Clarke International Service Division on 020 8556 4443 for assistance.

Monthly (When in regular use)

Check tightness of mounting bolts, and, head and column securing set screws.

If the mains lead is worn or cut, or damaged in any way, it should be replaced immediately.

Lubrication

All bearings are packed with grease at the factory and require no further lubrication.

Lubricate the Quill Shaft assembly with light oil, weekly.

After use

Remove all swarf from the machine and thoroughly clean all surfaces.

Components should be dry, with machined surfaces lightly oiled.

Always remove Mill/Drill bits, and store in a safe place.

CUTTING SPEEDS

In order to preserve the cutting tool, avoid damaging the workpiece and to produce a good finish, it is important to ensure the correct Cutting Speeds are used. Cutting Speed is the rate at which the cutting tool passes over the work, and is given in Feet Per Minute.

Factors which determine the best speed to use in any operation are:

- **Kind of material being worked, and its hardness value**
- **Quality of cut desired**
- **Type and size of Drill/Mill**
- **Depth of Cut**
- **Rate of Feed**

As a general guide, the Mill/Drill speed for a given bit size is according to the table below, using a light to moderate Feed rate. DO NOT force the tool.

Generally, the smaller the Mill/Drill the greater the required RPM. In soft material, the speed should be higher than for hard metals.

If you are not familiar with materials and cutting speeds, it is strongly recommended that you consult a qualified person or attend a suitable course on the subject.

| Bit Size | 3 | 4 | 5 | 6 | 8 | 10 |
|------------------------------|------|------|------|------|------|------|
| Alum & Brass Zinc Diecast | 2000 | 2000 | 1850 | 1600 | 1400 | 1000 |
| Iron & Mild Steel | 2000 | 2000 | 1650 | 1350 | 1000 | 800 |

ACCESSORIES

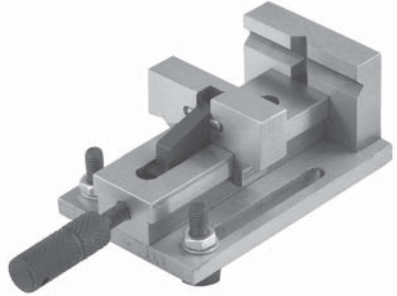
The following accessories are available from your **Clarke** dealer. When ordering, please quote the part number shown.

1. Quick Vise

With jaws 50mm wide, maximum opening of 37mm and 15mm deep.

'T' bolts with nuts and washers are provided for mounting to the CL250M Lathe cross slide.

Part Number: 7610743



2. Collet Set (MT2)

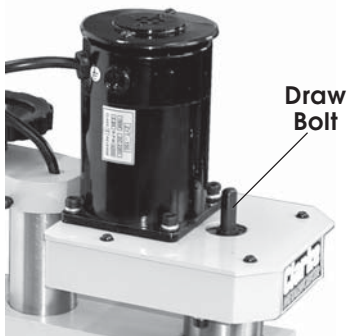
Part Number: 7601851

A set of 6 Collets for use with the HSS End Mills:

Insert the appropriate Collet into the spindle.

Insert the the draw bolt, provided, into the spindle, from the top and screw on to the Collet a few turns.

Insert the appropriate Mill into the jaws of the Collet, and tighten the draw bolt.



To remove the Collet, unscrew the draw bolt a few turns and tap its head with a mallet to break the seal between the Collet and spindle.

NOTE: A hole in the Spindle allows a tommy bar (not provided) to be inserted so that the spindle may be held whilst tightening/loosening is carried out.

3. HSS End Mill (2-Fluted)

Part Number: 7601852

A set of 6 End Mills, of the following sizes, for use with the Collet Set (see above)

- 3mm
- 4mm
- 5mm
- 6mm
- 8mm
- 10mm



4. Mill Chuck Set

Part Number: 7601853

A set of 6 collets with chuck with sizes:

- 3mm
- 4mm
- 5mm
- 6mm
- 8mm
- 10mm



1. Insert the shank of the chuck into the Mill Head Spindle and screw on to the end of the draw bolt, shown a 'A' Fig 7 on page 12. Tighten the draw bolt, holding the spindle steady by hand or by using a tommy bar (not provided) in the hole provided in the spindle.
2. Unscrew and remove the end collar 'A', insert the appropriate collet and reattach the end collar.
3. Insert the respective end mill into the collet and tighten using the 'C' spanner.

To remove the chuck, undo the draw bolt a turn or two, then tap its' head using a mallet to break the seal.

5. Drill Chuck with Key

NOTE: This tool is supplied with the machine.

Part Number: CL251MH910

Insert the shank of the chuck into the spindle and screw on to the end of the draw bolt, shown at 'A' Fig 7 on page 12.

Tighten the draw bolt, holding the spindle steady by hand or by using a tommy bar (not provided), in the hole provided in the spindle.

To remove the chuck, undo the draw bolt a turn or two, then tap its' head using a mallet to break the seal.



SPARE PARTS & SERVICING

For Spare Parts or Servicing, please contact your nearest dealer, or CLARKE International, on one of the following numbers.

PARTS - 020 8558 6696 : SERVICE - 020 8556 4443

PARTS & SERVICE FAX - 020 8 558 3622

PARTS E-MAIL - Parts@clarkeinternational.com

SERVICE E-MAIL - Service@clarkeinternational.com

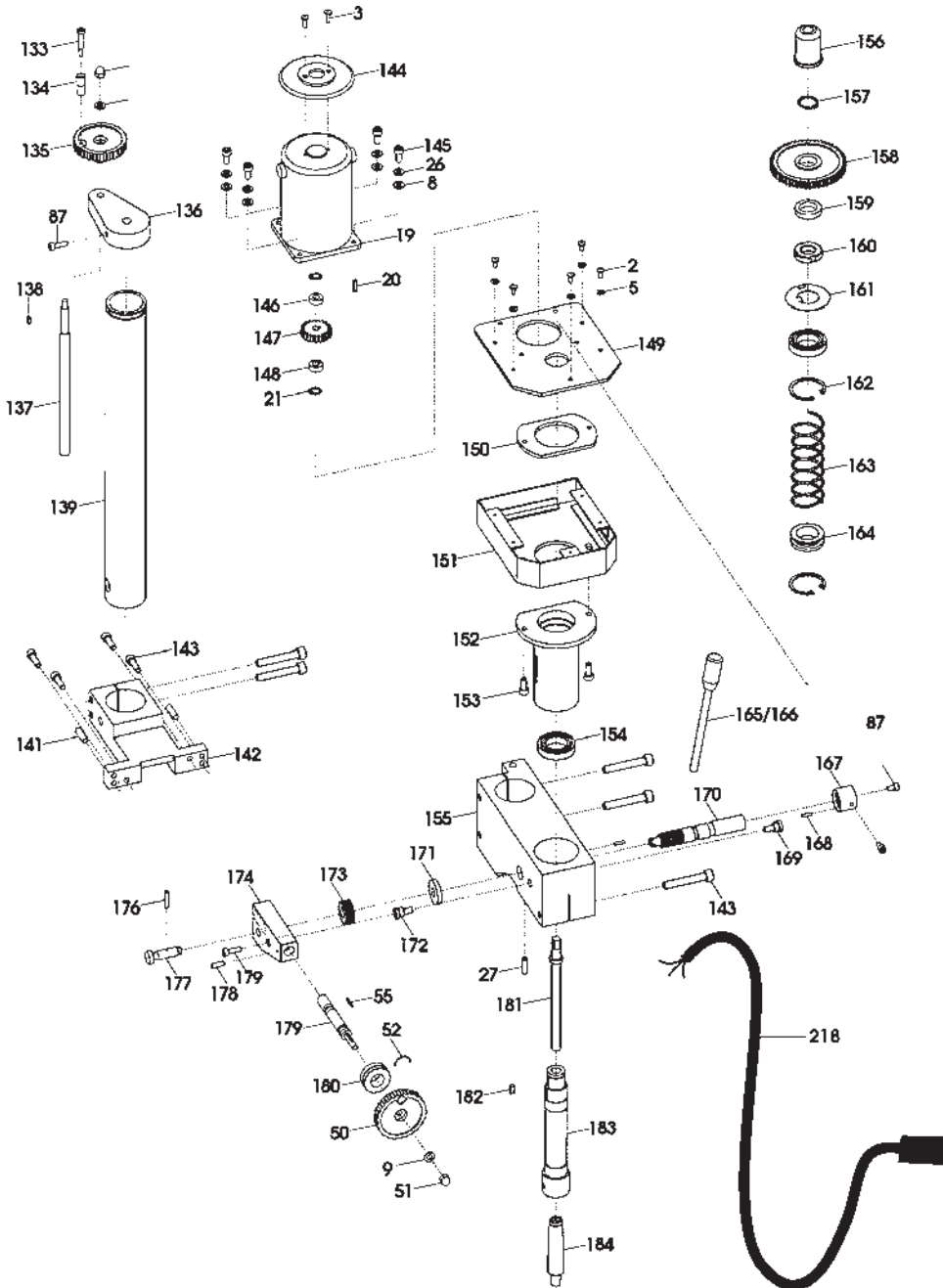
PARTS LIST

| No: | Description | Qty | Part No: | No: | Description | Qty | Part No: |
|-----|-------------------|-----|------------|-----|--------------------|-----|------------|
| 133 | Handle bolt | 1 | SG251MH133 | 177 | Connect shaft | 1 | SG251MH177 |
| 134 | Handle sleeve | 1 | SG251MH134 | 178 | Pin 3*18 | 1 | SG251MH178 |
| 135 | Handwheel | 1 | SG251MH135 | 179 | Worm shaft | 1 | SG251MH179 |
| 136 | Leadscrew bkt | 1 | SG251MH136 | 180 | Dial | 1 | SG251MH180 |
| 137 | Lifter | 1 | SG251MH137 | 181 | Lock bolt | 1 | SG251MH181 |
| 138 | Key 3*10 | 1 | SG251MH138 | 182 | Key 4*12 | 1 | SG251MH182 |
| 139 | Fuselage | 1 | SG251MH139 | 183 | Drill spindle | 1 | SG251MH183 |
| 140 | Screw M6*18 | 4 | SG251MH140 | 184 | Taper shank B12 | 1 | SG251MH184 |
| 142 | Fuselage bracket | 1 | SG251MH142 | 189 | Main Label | 1 | SG251MH189 |
| 144 | Motor cover | 1 | SG251MH144 | 191 | Small Label | 1 | SG251MH191 |
| 145 | Screw M6*12 | 5 | SG251MH145 | 192 | Fine feeding label | 1 | SG251MH192 |
| 146 | Spacing ring | 1 | SG251MH146 | 193 | Screw M6x20 | 1 | SG251MH193 |
| 147 | Motor gear | 1 | SG251MH147 | 196 | Cap nut M6 | 2 | SG251MH196 |
| 149 | Up cover plate | 1 | SG251MH149 | 197 | Washer 6 | 5 | SG251MH197 |
| 150 | Quill fixed plate | 1 | SG251MH150 | 198 | Screw M5x8 | 3 | SG251MH198 |
| 151 | Gear box | 1 | SG251MH151 | 199 | Handwheel | 1 | SG251MH199 |
| 152 | Spindle quill | 1 | SG251MH152 | 200 | Spring steel | 1 | SG251MH200 |
| 154 | Ball bearing | 2 | SG251MH154 | 201 | Key 2X10 | 1 | SG251MH201 |
| 155 | Spindle base | 1 | SG251MH155 | 202 | Washer 4 | 4 | SG251MH202 |
| 156 | Safety cover | 1 | SG251MH156 | 203 | Cap screw M4x8 | 4 | SG251MH203 |
| 157 | Check ring 20 | 1 | SG251MH157 | 204 | Check ring 8 | 2 | SG251MH204 |
| 158 | Spindle gear | 1 | SG251MH158 | 205 | Key 3x6 | 1 | SG251MH205 |
| 159 | Spacing ring | 1 | SG251MH159 | 206 | Spring washer 6 | 5 | SG251MH206 |
| 160 | Nut M24*1.5 | 1 | SG251MH160 | 207 | Motor | 1 | SG251MH207 |
| 161 | Washer 24 | 1 | SG251MH161 | 208 | Cap screw M4x12 | 2 | SG251MH208 |
| 162 | Check ring 38 | 2 | SG251MH162 | 209 | Screw M8x40 | 5 | SG251MH209 |
| 163 | Compr. spring | 1 | SG251MH163 | 210 | Washer 8 | 5 | SG251MH210 |
| 164 | Spring support | 1 | SG251MH164 | 211 | Site screw | 1 | SG251MH211 |
| 165 | Long handle | 1 | SG251MH165 | 212 | Flat washer 10 | 1 | SG251MH212 |
| 166 | Lever cap M8*40 | 1 | SG251MH166 | 213 | Nut M10 | 1 | SG251MH213 |
| 167 | Read out sleeve | 1 | SG251MH167 | 214 | Block | 1 | SG251MH214 |
| 168 | Spring pin 3*12 | 2 | SG251MH168 | 215 | Chuck guard | 1 | SG251MH215 |
| 170 | Gear shaft | 1 | SG251MH170 | 216 | Flat washer 4 | 2 | SG251MH216 |
| 171 | Spacing ring | 1 | SG251MH171 | 217 | Screw M4x14 | 2 | SG251MH217 |
| 172 | Connecting screw | 1 | SG251MH172 | 218 | Power Cable compl. | 1 | SG251MH217 |
| 173 | Bevel gear | 1 | SG251MH173 | | | | |
| 174 | Worm base | 1 | SG251MH174 | | | | |
| 175 | Screw M5*18 | 1 | SG251MH175 | | | | |
| 176 | Pin 3*12 | 1 | SG251MH176 | | | | |

Accessories:

- Drill chuck with key 1 SG251MH910

PARTS DIAGRAM



A SELECTION FROM THE VAST RANGE OF

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020 - 8988 - 7400

e-mail: Parts@clarkeinternational.com e-mail: Service@clarkeinternational.com