

**Rotabroach**<sup>TM</sup>

# Cobra

**Magnetic Drilling Machine**

**Models CM/200/1 & CM/200/3**

## **OPERATOR'S MANUAL**

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**A MEMBER OF THE OSL GROUP OF COMPANIES**

This machine (Serial No \_\_\_\_\_) is CE approved.

RLL233

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List of Contents with Magnetic Drill Unit		Check List
RD4329	Safety Strap	YES/NO
RA356	Pilot	YES/NO
RA359	Pilot	YES/NO
RA3013	Pilot	YES/NO
RA3030	Pilot	YES/NO
RA3047	Pilot	YES/NO
RA3057	Pilot	YES/NO
RD4088	4mm A/F Tee Handled Hexagon Key	YES/NO
RD4152	3mm Hexagon Key	YES/NO

[1] **ROTABROACH MAGNETIC DRILLING MACHINE  
MODELS CM/200/1/ & CM/200/3**

Maximum hole cutting capacity in .2/.3C steel = 65mm dia. x 50mm deep

Arbor bore = 19.05mm (3/4") dia.

<b>Motor Unit</b>				
Voltages	110v		230v	
normal full load	14 A	1400 W	6 A	1400 W
<b>Electro Magnet</b>	0.6A	69W	0.3A	69W
Size	180mm long 90mm wide			
Tractive Force at 20°C with 25mm minimum plate thickness <b>The use on any material less than 25mm thick will progressively reduce the magnetic performance. If possible, substitute material should be positioned under the magnet and work piece to equate to a suitable material thickness. If this is not possible, an alternative secure method of restraining the machine MUST be used.</b>	1200kgs			
<b>Total Load (magnet + motor)</b>	1469 W		1469 W	
<b>Overall Dimensions</b>				
Height - maximum extended	550mm			
Height - minimum	470mm			
Width (including Hand wheel)	200mm			
Length Overall (including Guard)	270mm			
<b>Nett Weight</b>	16kgs			
Maximum hand/arm vibration magnitude (measured at handle during operation in accordance with ISO5349, using a 22mm cutter through 13mm MS plate)	0.82 m/s <sub>rms</sub>			
Estimate of likely daily vibration exposure. Operation 30 holes @ 2 minute/hole.	0.29m/s <sub>rms</sub> A(8)			
Average noise level during cutting at operators ear position.	89dB(A)			

Ear defenders must be worn when operating this machine

These tools are UK designed, and manufactured with globally sourced components and conform with the requirements of EEC Document HD.400.1 and BS.2769/84

**Suitable only for a single phase 25-60Hz A.C. power supply**

**DO NOT USE ON D.C. SUPPLY**

**Do not use your magnetic drill on the same structure when arc welding is in progress.**

**D.C. current will earth back through the magnet and cause irreparable damage.**

**WARNING: THIS APPLIANCE MUST BE EARTHED!**

**NB: ANY MODIFICATIONS TO THIS MACHINE WILL INVALIDATE THE GUARANTEE**

## **READ BEFORE USING THE MACHINE**

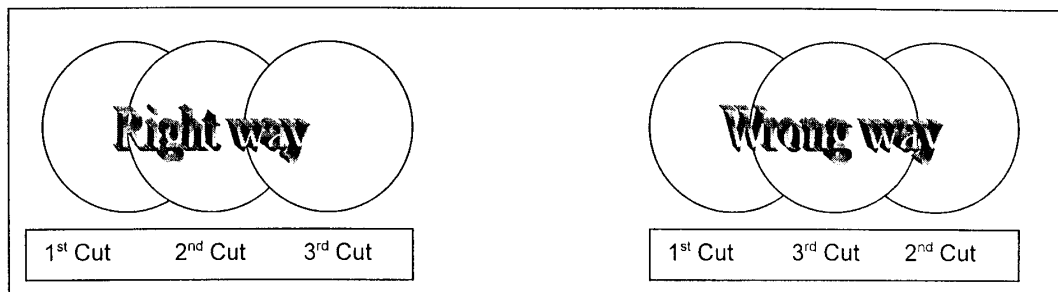
### **[2] SAFETY PROCEDURES**

- When using electrical tools, basic safety precautions should always be followed to reduce the risk of electric shock, fire, and personal injury.
- Do **NOT** use in wet or damp conditions. Failure to do so may result in personal injury.
- Do **NOT** use in the presence of flammable liquids or gases. Failure to do so may result in personal injury.
- **ALWAYS SECURE THE MACHINE WITH THE SAFETY STRAP - PART NO. RD4329 BEFORE STARTING TO OPERATE** - for the user's protection in case of power failure or the magnet's breaking loose whilst in use. Failure to do so may result in personal injury.
- **ALWAYS WEAR APPROVED EYE AND EAR PROTECTION WHEN THE EQUIPMENT IS IN OPERATION.** Failure to do so may result in personal injury.
- Disconnect from the power source when changing cutters or working on the machine.
- When changing cutters, or removing swarf, **ALWAYS** wear approved gloves.
- **ALWAYS ENSURE CUTTER RETAINING SCREWS ARE SECURE** - they sometimes vibrate loose when the machine is in continuous use.
- Regularly clear the work area and machine of swarf and dirt, paying particular attention to the underside of the magnet base.
- With a gloved hand, and after switching off, remove any swarf which might have gathered around the cutter and arbor before proceeding with the next hole.
- Before operating the machine, always remove tie, rings, watches and any loose adornments which might entangle with the rotating machinery.
- Should the cutter become 'fast' in the workpiece, stop the motor immediately to prevent personal injury. Disconnect from the power source and turn arbor to and fro. **DO NOT ATTEMPT TO FREE THE CUTTER BY SWITCHING THE MOTOR ON AND OFF.**
- If the machine is accidentally dropped, always thoroughly examine the machine for signs of damage and check that it functions correctly before trying to drill a hole.
- Regularly inspect the machine and check that nuts and screws are tight.
- Always ensure when using the machine in an inverted position that only the minimum amount of coolant is used and that care is taken to ensure that coolant does not drip on to the motor unit.
- Cutting tools may shatter, **ALWAYS** position the guard over the cutter before activating the machine. Failure to do so may result in personal injury.

- On completion of the cut, a slug will be ejected. DO NOT operate the machine if the ejected slug may cause injury.

### [3] OPERATING INSTRUCTIONS

- Keep the inside of the cutter clear of swarf. It restricts the operating depth of the cutter.
- Ensure that the coolant bottle contains sufficient cutting oil to complete the required operating duration. Refill as required.
- Occasionally depress the pilot to ensure cutting fluid is being correctly metered.
- To start the machine, first switch on the magnet by turning the rotary switch to position <1>. Then start the motor by depressing the GREEN start button.
- ALWAYS switch off the motor by depressing the RED stop button. DO NOT switch off the motor by turning the magnet switch to zero.
- Apply light pressure when commencing to cut a hole until the cutter is introduced into the work surface. Pressure can then be increased sufficiently to load the motor. Excessive pressure is undesirable, it does not increase the speed of penetration and will cause the safety overload protection device to stop the motor, (the motor can be restarted by operating the motor start button), and may cause excessive heat which may result in inconsistent slug ejection
- Always ensure that the slug has been ejected from the previous hole before commencing to cut the next.



- Always cut overlapping holes as illustrated above – do not use excessive pressure and ensure cutting fluid is reaching teeth of the cutter.
- If the slug sticks in the cutter, move the machine to a flat surface, switch on the magnet and gently bring the cutter down to make contact with the surface. This will usually straighten a cocked slug and allow it to eject normally.
- Apply a small amount of light oil lubricant regularly to slide and arbor support bearing.
- Cutter breakage is usually caused by insecure anchorage, a loosely fitting slide or a worn bearing in the arbor support. (Refer to routine maintenance instructions).
- Only use approved cutting fluid. Rotabroach cutting fluid has been specially formulated to maximise the cutters performance. It is available in 1 litre (RD208), 5 litre (RD229), and 25 litre (RD220) containers.

## SPEED SELECTION

The machine is equipped with two speed ranges, High, and Low, and a stepless variation of each range.

The speed range is changed by the rotary change switch located on the gearbox side. Do not change gear while the motor is in motion.

The stepless variation is adjusted by rotating the disk located on top of the motor. The disk is graduated into six numerically designated segments.

Before cutting holes the work piece material specification must be determined to facilitate the correct cutting speed selection (See section 13 Cutting speeds). Site conditions, eg diameter and condition of cutter, material condition, material thickness, etc must also be taken into account when determining the suitable cutting speed. The speed and feed rate must continuously be monitored and adjusted to ensure optimum cutting conditions prevail.

## [4] EXTENSION CABLE SELECTION

The machines are factory fitted with a 3 metre length of cable having three conductors 1.5mm\_

LIVE, NEUTRAL and EARTH. If it becomes necessary to fit an extension cable from the power source, care must be taken in using a cable of adequate capacity. Failure to do so will result in a loss of traction by the magnet and a reduction of power from the motor.

Assuming a normal AC supply of the correct voltage, it is recommended that the following extension lengths shall not be exceeded:

**For 110v supply: 3.5metres of 3 core x 1.5mm\_**

**For 230v supply: 26metres of 3 core x 1.5mm\_ or  
17metres of 3 core x 1.0mm\_**

**ALWAYS DISCONNECT THE MACHINE FROM THE POWER SOURCE WHEN CHANGING CUTTERS.**

## [5] MOUNTING OF CUTTERS

The machine has been made to accept cutters having 19.05mm (3/4") dia. shanks

The following procedure is to be used when mounting cutters.

Take appropriate pilot and place through hole in shank of cutter. Insert shank of cutter into 3/4" dia. bore of arbor, ensuring alignment of two drive flats with socket screws RD4066. Tighten both screws using hexagon key.

**[6] CUTTERS AND PILOTS****Cutter & Pilot relationship.**

Cutter designation.	Diameter.	Pilot type.
RC, RCV	12	RA3057
	13 - 18	RA359
	19 - 52	RA3047
<hr/>		
RCL, RCVL	12	RA3013
	13 - 17	RA3030
	18 - 65	RA356
<hr/>		
CRWC	18 - 36	RA3047
<hr/>		
SRC, SRCV	12	SRA3057
	13 - 52	SRA25
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SRCL, SRCVL	12	SRA3013
	13 - 65	SRA50
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SCRWC	18 - 36	SRA25

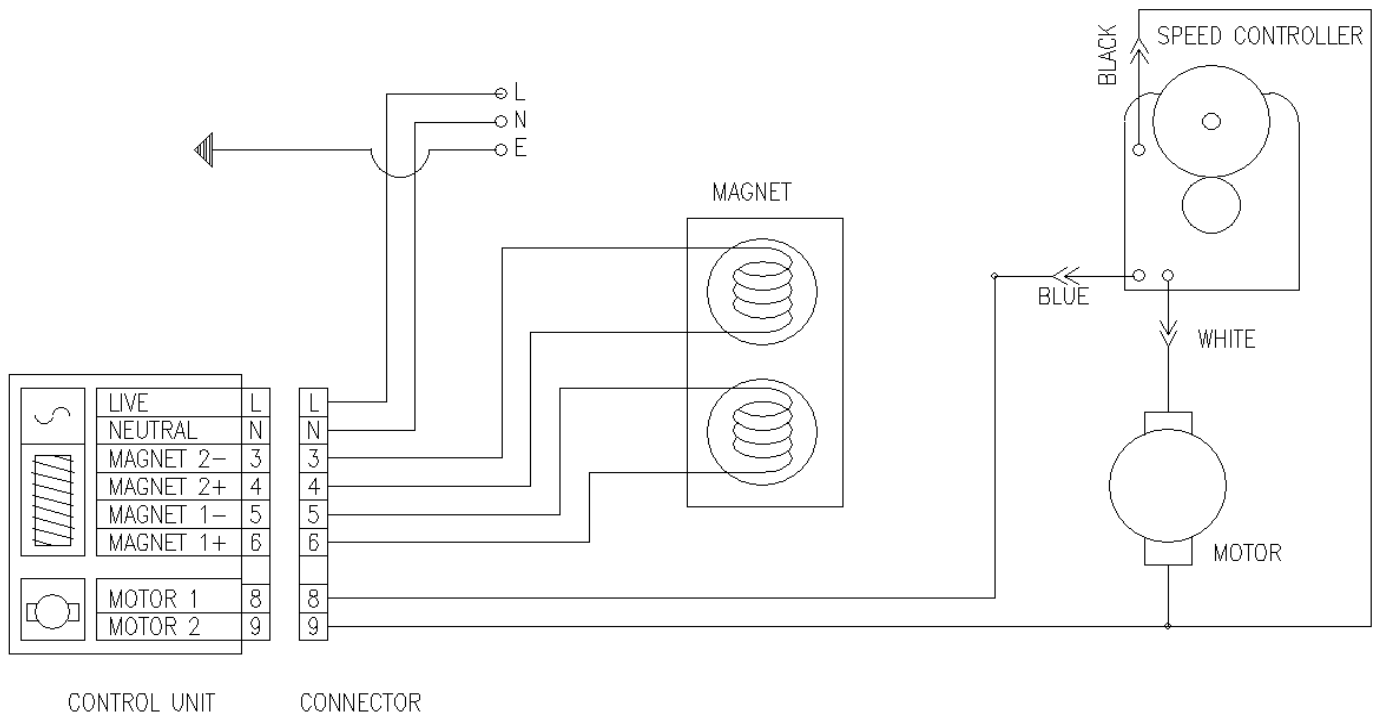
**[7] REMEDIES FOR HOLE MAKING PROBLEMS**

<i>Problem</i>	<i>Cause</i>	<i>Remedy</i>
1) Magnetic base won't hold effectively	<p>Material being cut may be too thin for efficient holding of magnet</p> <p>Swarf or dirt under magnet</p> <p>Irregularity on magnet face or work-piece</p> <p>Insufficient current going to magnet during drilling cycle</p>	<p>Attach an additional piece of metal under work-piece where magnet will be located, or mechanically clamp magnetic base to work-piece</p> <p>Clean magnet</p> <p>Use extreme care, file only imperfections flush to surface</p> <p>Confirm power supply and output from control unit.</p>
2) Cutter skips out of centre-punch mark at initiation of cut	<p>Magnetic base is not holding effectively</p> <p>Worn arbor bearing and/or ejector sleeve</p> <p>Too much feed pressure at start of cut</p> <p>Cutter is worn, chipped or incorrectly sharpened</p> <p>Poor centre-punch mark; weak pilot spring; pilot not centred in centre-punch mark</p> <p>Worn or bent pilot, worn pilot hole</p> <p>Loose bolts on arbor bearing support bracket or loose gib adjusting set screws</p>	<p>See causes and remedies above</p> <p>Replace! Only a few thousandths wear permissible.</p> <p>Light pressure until a groove is cut. The groove then serves as a stabilizer.</p> <p>Replace or re-sharpen. Sharpening service is available.</p> <p>Improve centre-punch and/or replace worn parts</p> <p>Replace part or parts</p> <p>Adjust where necessary</p>

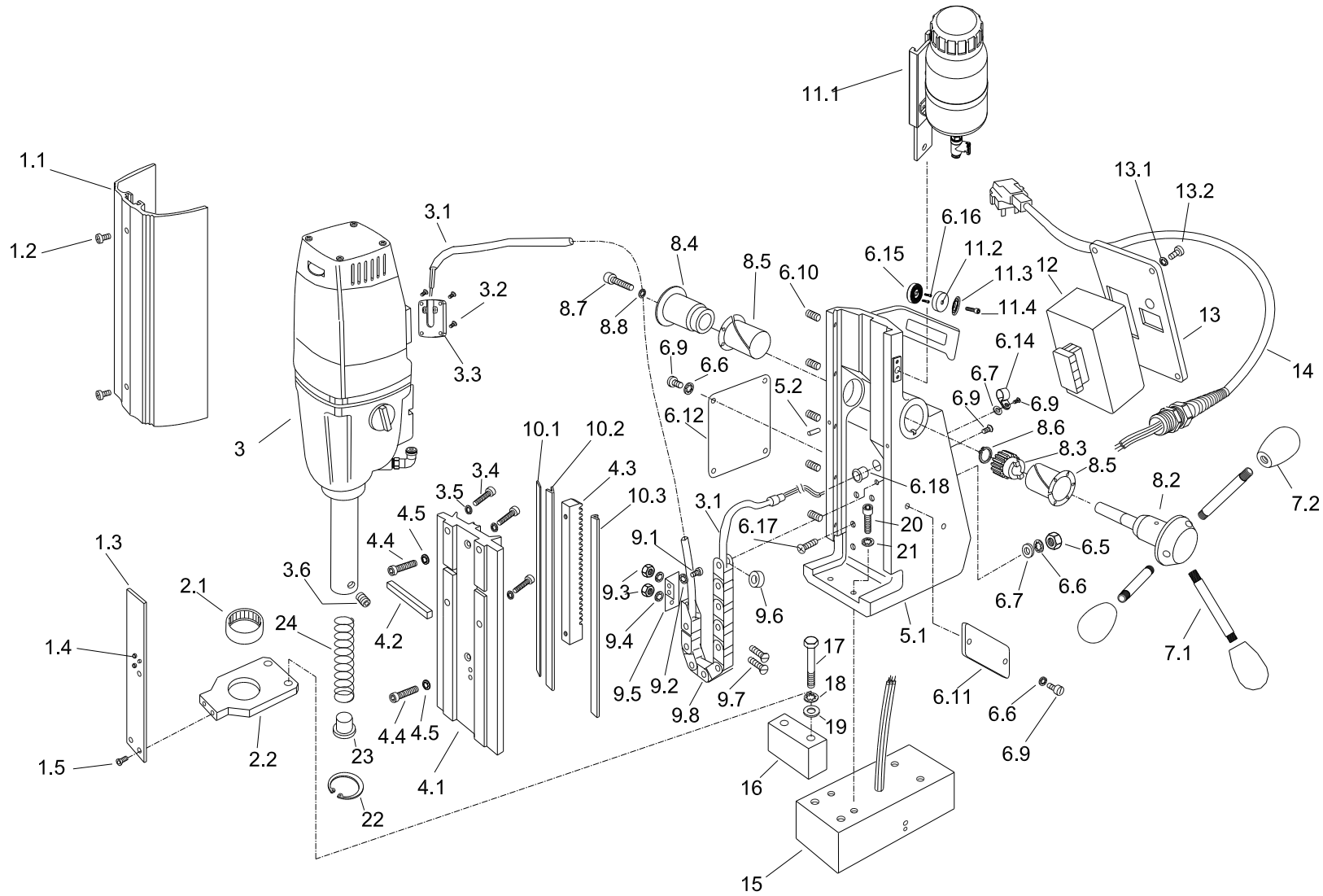


<i>Problem</i>	<i>Cause</i>	<i>Remedy</i>
3) Excessive drilling pressure required	<p>Incorrectly re-sharpened, worn or chipped cutter</p> <p>Coming down on swarf lying on surface of work-piece</p> <p>Gibs out of adjustment or lack of lubrication</p> <p>Swarf accumulated (packed) inside cutter</p> <p>Incorrect speed selection.</p>	<p>Re-sharpen or replace</p> <p>Clean work-piece. Take care not to start a cut on swarf</p> <p>Lubricate gib and/or adjust grub screws</p> <p>Clear cutter</p> <p>Select appropriate speed.</p>
4) Excessive cutter breakage	<p>Steel swarf or dirt under cutter</p> <p>Incorrectly re-sharpened or worn cutter</p> <p>Cutter skipping</p> <p>Slide-ways need adjustment</p> <p>Cutter not attached tightly to arbor</p> <p>Insufficient use of cutting oil or unsuitable type of oil</p> <p>Incorrect speed selection.</p>	<p>Remove cutter, clean part thoroughly and replace</p> <p>Always have a new cutter on hand to refer to for correct tooth geometry, together with instruction sheet</p> <p>See causes and remedies (2)</p> <p>Tighten slide-way</p> <p>Retighten</p> <p>Fill arbor with an oil of light viscosity and check to be sure oil is being metered into cutter when pilot is depressed. If not, check pilot groove and arbor internally for dirt or apply oil externally. Even a small amount of oil is very effective</p> <p>Select appropriate speed.</p>
5) ) Excessive cutter wear	<p>See cause and remedy above.</p> <p>Incorrectly re-sharpened cutter</p> <p>Insufficient or spasmodic cutting pressure</p>	<p>Refer to instructions and a new cutter for proper tooth geometry</p> <p>Use sufficient steady pressure to slow the drill down. This will result in optimum cutting speed and chip load</p>

**[8] WIRING DIAGRAM**

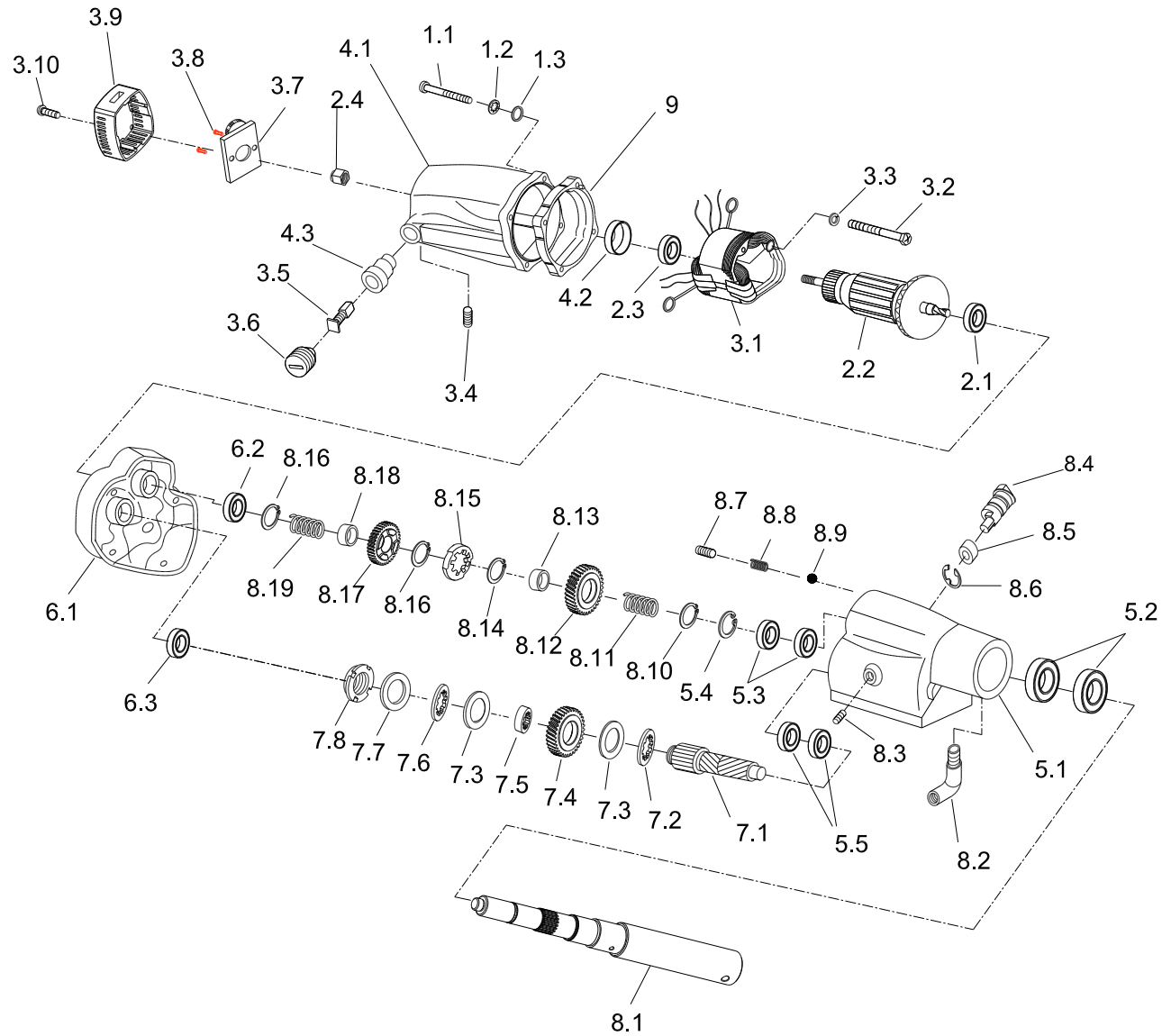


[9] EXPLODED VIEW OF COMPLETE MACHINE



[9] Parts list for CM/200/1 & CM/200/3								
Item	Component	Part No.	Item	Component	Part No.	Item	Component	Part No.
1	Guard assembly	RD25501	6.6	Internal washer	RD4069	9.6	Chain bush	RD4521
1.1	Guard	RD35522	6.7	Washer	RD4070	9.7	Countersunk set screw	RD4018
1.2	Pan head screw	RD4077	6.8	Saddle clamp	RD4071	9.8	Chain	RD3558
1.3	Guard bracket	RD3246	6.9	Pan head screw	RD4077	10	Gib strap assembly	RD25510
1.4	Spring plunger	RD4346	6.10	Socket set screw	RD4312	10.1	Gib support strip	RD3505
1.5	Countersunk screw	RD4347	6.11	Name plate	RD4503	10.2	Adjustable gib strip	RD3504
2	Bearing bracket assembly	RD25503	6.12	Information plate	RD4502	10.3	Static gib strip	RD3503
2.1	Arbor bearing	RD43301	6.13	Conclamp	RD472	11	Oil bottle assembly	RD23303
2.2	Bearing bracket	RD35535	6.14	Cable clip	RD45532	11.1	Bottle & bracket	RD23317
3	Motor & gearbox assembly (110v)	RD25551	6.15	Fixed ratchet wheel	RD33338	11.2	Adjustable ratchet wheel	RD33319
3	Motor & gearbox assembly (230v)	RD25553	6.16	Socket head cap screw	RD4414	11.3	Tension plate	RD33320
3.1	Motor cable assembly	RD25502	6.17	Pan head screw	RD45501	11.4	Socket head set screw	RD4269
3.2	Countersunk screw	RD4418	6.18	Bush	RD4079	12	Control unit assembly (110v)	RD25511
3.3	Cable cover	RD33321	7	Capstan arm assembly	RD25504	12	Control unit assembly (230v)	RD25513
3.4	Socket head cap screw	RD4091	7.1	Capstan arm	RD3014	13	Fascia plate	As required
3.5	Washer	RD4092	7.2	Knob	RD43302	13.1	Shakeproof washer	RD4069
4	Slide assembly	RD25505	8	Capstan assembly	RD25509	13.2	Pan head screw	RD4077
4.1	Slide	RD35521	7	Capstan arm assembly	RD25504	14	Mains cable assembly (110v)	RD271
4.2	Key	RD35536	8.2	Capstan hub assembly	RD2506	14	Mains cable assembly (230v)	RD272
4.3	Rack	RD4048	8.3	Pinion	RD4049	15	Magnet base assembly	RD3557
4.4	Socket head cap screw	RD4091	8.4	Pinion shaft collar	RD3502	16	Arbor space bracket	RD3507
4.5	Washer	RD4092	8.5	Pinion bearing	RD403	17	Arbor bracket bolt	RD4517
5	Housing sub assembly	RD2507	8.6	Pinion circlip	RM22876	18	Shakeproof washer	RD4079
5.1	Housing	RD3500	8.7	Socket head cap screw	RD4098	19	Plain washer	RD4078
5.2	Tension pin	RD3026	8.8	Spring washer	RD4207	20	Magnet fixing screw	RD4098
6	Housing assembly	RD25508	9	Cable chain assembly	RD2505	21	Shakeproof washer	RD4096
5	Housing sub assembly	RD2507	9.1	Socket head cap screw	RD4414	22	Circlip	RD4056
6.2	Earth terminal	RD3026	9.2	Shakeproof washer	RD4069	23	Button	RA354
6.3	Aluminum scale	RD3027	9.3	Hex nut	RD4250	24	Compression spring	RA355
6.4	Countersunk set screw	RD4046	9.4	Washer	RD4045			
6.5	Hex nut	RD4068	9.5	Chain fixing bracket	RD3515			
		Issue 4	4.2	Was RD3009				

[10] EXPLODED VIEW OF GEARBOX AND MOTOR UNITS



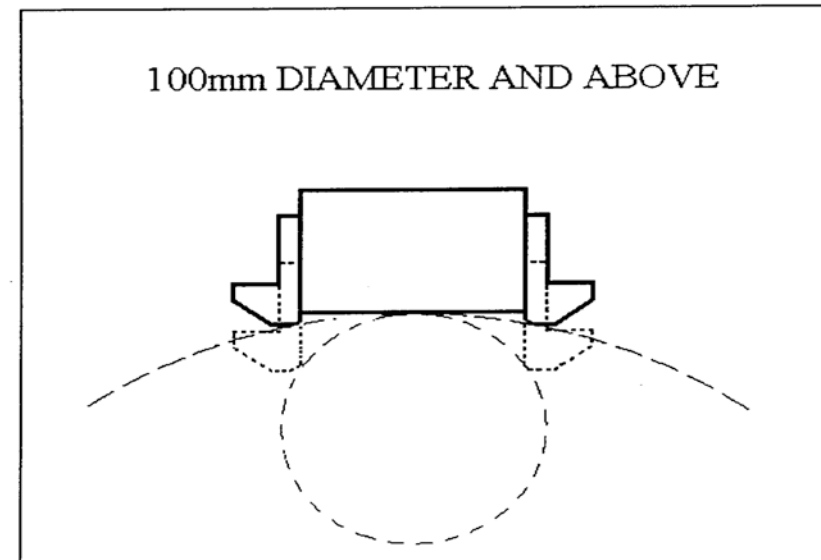
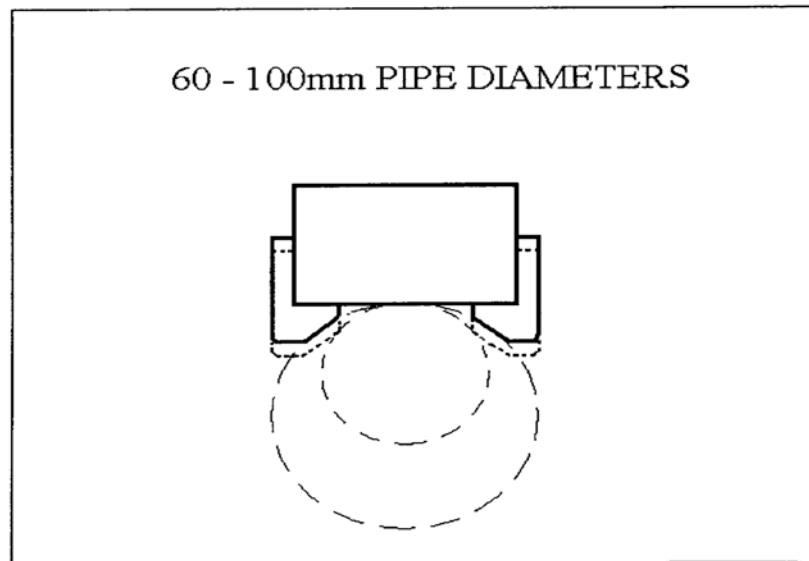
**Part list of motor & gearbox(Cobra)**

<b>Item</b>	<b>Component</b>	<b>Part No.</b>	<b>Item</b>	<b>Component</b>	<b>Part No.</b>	<b>Item</b>	<b>Component</b>	<b>Part No.</b>
1	Motor assembly (110v)	RD25521	3.7	Speed controller assembly (110v)	RD23330	7.7	Disk spring	RD45506
1	Motor assembly (230v)	RD25523	3.7	Speed controller assembly (230v)	RD23343	7.8	Lock nut	RD45503
2	Armature assembly (110v)	RD25531	3.8	Screw	RD45501	8	Gearbox assembly	RD25506
2	Armature assembly (230v)	RD25533	3.9	End cap	RD35520	5	Gearbox housing assembly	RD25515
3	Field coil & motor housing assembly (110v)	RD25561	3.10	Screw	RD45529	6	Inner gearplate assembly	RD25514
3	Field coil & motor housing assembly (230v)	RD25563	4	Motor housing assembly	RD25512	7	Clutch assembly	RD25507
1.1	Socket head cap screw	RD45532	4.1	Motor housing	RD35516	8.1	Arbor spindle	RD35501
1.2	Shakeproof washer	RD4092	4.2	Bush	RD35532	8.2	Coolant elbow	RD43324
1.3	Washer	RD4205	4.3	Brush holder	RD35517	8.3	Screw	RD45510
2	Armature assembly (110v)	RD25531	5	Gearbox housing assembly	RD25515	8.4	Gear selector	RD35530
2	Armature assembly (230v)	RD25533	5.1	Gearbox	RD35506	8.5	Bush	RD45521
2.1	Bearing	RD45517	5.2	Seal kit	RD45508	8.6	Circlip	RD45513
2.2	Armature (110v)	RD35521	5.3	Bearing kit (arbor spindle)	RD45511	8.7	Socket set screw	RD45524
2.2	Armature (230v)	RD35523	5.4	Circlip	RD45512	8.8	Spring	RD45516
2.3	Bearing	RD45526	5.5	Bearing kit (inter pinion shaft)	RD45502	8.9	Steel ball	RD45515
2.4	Speed sensor	RD35515	6	Inner gearplate assembly	RD25514	8.10	Circlip	RD45509
3	Field coil & motor housing assembly (110v)	RD25561	6.1	Inner gearplate	RD35511	8.11	Spring	RD45514
3	Field coil & motor housing assembly (230v)	RD25563	6.2	Bearing	RD45522	8.12	Gear	RD35507
4	Motor housing assembly	RD25512	6.3	Bearing	RD45507	8.13	Bush	RD35514
3.1	Field coil (110v)	RD35551	7	Clutch assembly	RD25507	8.14	Circlip	RD45518
3.1	Field coil (230v)	RD35553	7.1	Interpinion shaft	RD35505	8.15	Gear selector ring	RD35509
3.2	Screw	RD45525	7.2	Washer	RD45504	8.16	Snap ring	RD45519
3.3	Shakeproof washer	RD4092	7.3	Thrust washer	RD45505	8.17	Gear	RD35512
3.4	Socket head set screw	RD45527	7.4	Gear	RD35503	8.18	Bush	RD35508
3.5	Carbon brush	RD35518	7.5	Bush	RD35502	8.19	Spring	RD45520
3.6	Brush cover	RD35519	7.6	Washer	RD35504	9	Inner cap	RD35513

## [11] PIPE ADAPTOR KIT RD2311

### FITTING INSTRUCTIONS

- Dependent upon the size of the pipe to be cut (see illustrations) attach adjustable angle plates RD3328 with cap screws RD4325 and washers RD4205 (4 off each) to the magnet sides. Do not tighten.
- Locate the machine on the centreline pipe taking care that the magnet is in line with the longitudinal axis of the pipe.
- Switch on the magnet and move the sliding plates down to the outside diameter of the pipe. Tighten the screws on both sides by hand then check once again that the full length of the moving plates is touching the pipe at the front and back, fasten the plate securely. Feed the safety strap through the lugs at the front of the housing, around the pipe and pull tight.
- When cutting the hole DO NOT use excessive pressure but rather let the cutter ease into the cutting surface.



**[12] WIRING OF MAINS PLUG**

The wires of the mains lead are coloured in accordance with the following code:

<b>GREEN and YELLOW</b>	<b><i>EARTH</i></b>
<b>BLUE</b>	<b><i>NEUTRAL</i></b>
<b>BROWN</b>	<b><i>LIVE</i></b>

As the colours of the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug - CONNECT AS FOLLOWS;

- The wire coloured **GREEN and YELLOW** must be connected to the terminal marked ***E*** or marked by the earth symbol or coloured **GREEN** or **GREEN and YELLOW**
- The wire coloured **BROWN** must be connected to the terminal marked ***L*** or coloured **RED**
- The wire coloured **BLUE** must be connected to the terminal marked ***N*** or coloured **BLACK**

In the U.K. fit a fused 13A plug for 230v supply; for 110v supply fit a 15A transformer plug

**WARNING - THIS APPLIANCE MUST BE EARTHED!**



### 13] CUTTING SPEEDS.

Typical cutting speeds (RPM) for various materials

Cutter dia	Surface speed.			
	9	15	30	45
12	239	398	796	1194
13	220	367	734	1102
14	205	341	682	1023
15	191	318	637	955
16	179	298	597	895
17	168	281	562	842
18	159	265	530	796
19	151	251	503	754
20	143	239	477	716
21	136	227	455	682
22	130	217	434	651
23	125	208	415	623
24	119	199	398	597
25	115	191	382	573
26	110	184	367	551
27	106	177	354	530
28	102	171	341	512
29	99	165	329	494
30	95	159	318	477
31	92	154	308	462
32	90	149	298	448
33	87	145	289	434
34	84	140	281	421
35	82	136	273	409
36	80	133	265	398
37	77	129	258	387
38	75	126	251	377

Cutter dia	Surface speed.			
	9	15	30	45
39	73	122	245	367
40	72	119	239	358
41	70	116	233	349
42	68	114	227	341
43	67	111	222	333
44	65	109	217	326
45	64	106	212	318
46	62	104	208	311
47	61	102	203	305
48	60	99	199	298
49	58	97	195	292
50	57	95	191	286
51	56	94	187	281
52	55	92	184	275
53	54	90	180	270
54	53	88	177	265
55	52	87	174	260
56	51	85	171	256
57	50	84	168	251
58	49	82	165	247
59	49	81	162	243
60	48	80	159	239
61	47	78	157	235
62	46	77	154	231
63	45	76	152	227
64	45	75	149	224
65	44	73	147	220

These speeds should be viewed as a suggested starting point only.  
The machine speed may require adjustment to suit the application conditions.

Material	Surface speed (M/min)	
Aluminium		60-90
Cast iron	Soft	30-50
	Hard alloy	15-21
	Malleable	15-30
Steel	Mild (460 N/mm <sub>2</sub> )	24-30
	(460-770 N/mm <sub>2</sub> )	15-27
	(770-1070 N/mm <sub>2</sub> )	9-15
	1070-1230 N/mm <sub>2</sub> )	6-9
Stainless steel	Ferritic	15-18
	Austenitic	12-15
	Martensitic	9-15

## Cutter diameter and speed relationship

High gear.			Low gear.		
Selector No	RPM	Cutter Dia.	Selector No	RPM	Cutter Dia.
1	300	32	1	150	62
2	360	26	2	180	52
3	430	22	3	215	46
4	500	19	4	250	38
5	600	16	5	300	32
6	650	14	6	330	30

This data is presented for guidance only, and should be adjusted to suit site and material conditions.

## [14] REPLACEMENT OF MOTOR SUPPLY CABLE.

### TO REMOVE OLD CABLE AND CHAIN

Ensure that the machine is disconnected from any source of power. Failure to do so may result in personal injury.

- Remove screws #73 and withdraw the control unit from the housing.
- Disconnect the nine-pin cable connector from the control panel
- Remove the motor supply cable leads (8 and 9) from the terminal block by unfastening the screws.
- Release the cable clip inside the housing cavity.
- Rotate the capstan to raise the motor & gearbox assembly to the maximum up position (ensure that cutter retaining screws #11 do not foul arbor support bracket #7).
- Remove the cable chain anchor screw #68 and release the cable chain #29.
- Remove capstan retaining screw #49 and withdraw capstan assembly #55
- Withdraw the motor and slide assembly from the housing.
- Remove screws #18 and separate motor and slide.
- Remove the cable from the cable chain.
- Remove screws #67 and cable cover #66.
- Release the cable from the cable clip and terminal blocks.

### TO REFIT NEW CABLE.

- Reverse the above procedure.
- Now test the machine as described below:

#### **Earth Continuity Test**

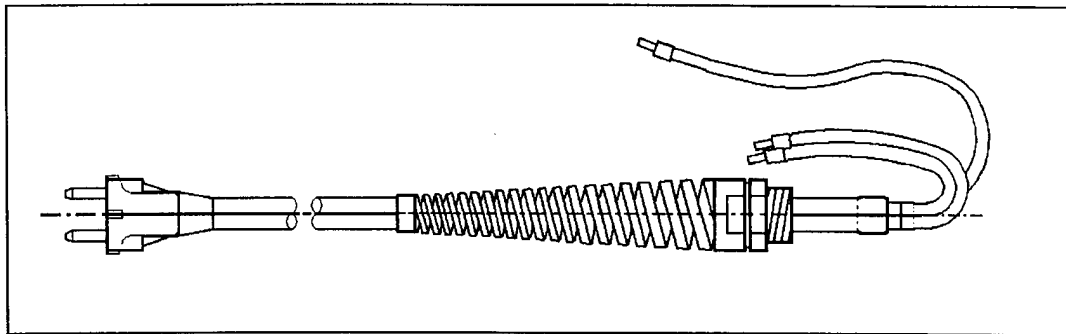
A current of 25A having a no load voltage of 6v is passed between the earth contact of the mains plug and the frame of the machine. With the standard 3m length of cable the resistance shall not exceed **0.3 ohms**. If this figure is exceeded, a faulty earth connection has been made. It **must be found and rectified**.

#### **Insulation Resistance Test**

With the magnet switch in the ON position, apply a voltage of 1.5kv between the live connection on the mains plug and the frame of the machine for a duration of 7 seconds. The reading obtained should not fall below infinity. Should a fault be indicated it **must be found and rectified**.

### REPLACEMENT OF MAINS SUPPLY CABLES RD271 and RD272

The replacement is a complete factory produced assembly, and RD272 (230v) is illustrated below.



### TO REMOVE OLD CABLE FROM MACHINE

- The machine **MUST** be disconnected from any source of power supply before attempting to conduct any maintenance work. Failure to do so may result in personal injury.
- Remove control unit by unfastening screws #73 and lifting the unit clear of the housing.
- Remove the 9-pin connector block on the rear of the control unit.
- Wires which are fastened into the block and not from the mains cable **must not be released**. Unfasten the terminal screws marked L & N and release the mains cable wires.
- The mains supply cable is now only connected to the earth terminal, which is located in the housing cavity. Release the top nut of the assembly and extract the wire from under the saddle clamp. All wire connections are now released.
- Using a 27mm spanner unfasten the mains cable gland, which screws directly into the housing. The whole cable assembly comprising of the sleeve, gland and cable will be released.

### TO FIT A NEW CABLE

- To fit a new cable, reverse the above procedure.
- Now test the machine as described below:
- Conduct an Earth Continuity Test. This is accomplished in the following manner:

A current of 25 amps having a no load voltage of 6V is passed between the earth contact of the plug (or mains supply earth conductor) and in turn to any accessible metallic part of the machine. With a standard 3-metre long mains supply cable affixed to the machine the resistance shall not exceed **0.3 ohms**. If this figure is exceeded, a faulty earth connection has been made. It **must be found and rectified**.

### Insulation Resistance Test

With the magnet switch in the ON position, apply a voltage of 1.5kv between the live connection on the mains plug and the frame of the machine for a duration of 7 seconds. The reading obtained should not fall below infinity. Should a fault be indicated it **must be found and rectified**.

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