

***Rotabroach***

# **ELEMENT 40 PERM**

## **Magnetic drilling machine**

Model number Element40/1PERM & Element40/3PERM

This machine (Serial Number) is CE approved



***Rotabroach***

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**Thank you for purchasing our  
Element 40 PERM magnetic drill.**

**We would really like your feedback  
on the machine.**

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P/N	List of Contents with Magnetic Drill Unit
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RD4329	Safety Strap
RD4088	4mm A/F Handle Hexagon Key
RD4152	3mm Hexagon Key
RD33153	Drill Chuck Adaptor
RD4230	6mm Hexagon Key
RD43099	Drill Chuck and Key
RDA3105	Safety Glasses
RDB3066	Carbon Brush

# INTENDED USE

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The intended use of this magnetic drill is to drill holes in ferrous metals. The magnet is used to hold the drill in place whilst the drill is functioning. It is designed for use in fabrication, construction, railways, petrochemical and any other applications when drilling ferrous metal.

Any deviation from its intended use will not be covered by warranty.

# GENERAL SAFETY RULES

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**WARNING!** Read all safety warnings, instructions, illustrations, and specifications provided with this power tool. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious injury.

**Save all warnings and instructions for future reference.**

The term "power tool" in the warnings refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

## Work area safety

**Keep work area clean and well lit.** Cluttered or dark areas invite accidents.

**Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** Power tools create sparks which may ignite the dust or fumes.

**Keep children and bystanders away while operating a power tool.** Distractions can cause you to lose control.

## Electrical safety

- a) Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools.** Unmodified plugs and matching outlets will reduce risk of electric shock.
- b) Avoid body contact with earthed or grounded surfaces, such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electric shock if your body is earthed or grounded.
- c) Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- d) Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges or moving parts.** Damaged or entangled cords increase the risk of electric shock.
- e) When operating a power tool outdoors, use an extension cord suitable for outdoor use.** Use of a cord suitable for outdoor use reduces the risk of electric shock.
- f) If operating a power tool in a damp location is unavoidable, use a residual current device (RCD) protected supply.** Use of an RCD reduces the risk of electric shock.

**NOTE:** The term "residual current device (RCD)" can be replaced by the term "ground fault circuit interrupter (GFCI)" or "earth leakage circuit breaker (ELCB)".

## Personal Safety

- a) Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol or medication.** A moment of inattention while operating power tools may result in serious personal injury.
- b) Use personal protective equipment. Always wear eye protection.** Protective equipment such as a dust mask, non-skid safety shoes, hard hat or hearing protection used for appropriate conditions will reduce personal injuries.
- c) Prevent unintentional starting. Ensure the switch is in the off-position before connecting to power source and/or battery pack, picking up or carrying the tool.** Carrying power tools with your finger on the switch or energising power tools that have the switch on invites accidents.
- d) Remove any adjusting key or wrench before turning the power tool on.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
- e) Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
- f) Dress properly. Do not wear loose clothing or jewellery. Keep your hair and clothing away from moving parts.** Loose clothes, jewellery or long hair can be caught in moving parts.
- g) If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used.** Use of dust collection can reduce dust-related hazards.
- h) Do not let familiarity gained from frequent use of tools allow you to become complacent and ignore tool safety principles.** A careless action can cause severe injury within a fraction of a second

## Power tool use and care

- a) Do not force the power tool. Use the correct power tool for your application.** The correct power tool will do the job better and safer at the rate for which it was designed.
- b) Do not use the power tool if the switch does not turn it on and off.** Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
- c) Disconnect the plug from the power source and/or remove the battery pack, if detachable, from the power tool before making any adjustments, changing accessories, or storing power tools.** Such preventive safety measures reduce the risk of starting the power tool accidentally.
- d) Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool.** Power tools are dangerous in the hands of untrained users.
- e) Maintain power tools and accessories. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use.** Many accidents are caused by poorly maintained power tools.
- f) Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
- g) Use the power tool, accessories and tool bits etc. in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the power tool for operations different from those intended could result in a hazardous situation.
- h) Keep handles and grasping surfaces dry, clean and free from oil and grease.** Slippery handles and grasping surfaces do not allow for safe handling and control of the tool in unexpected situations.

## Service

**Have your power tool serviced by a qualified repair person using only identical replacement parts.** This will ensure that the safety of the power tool is maintained

# INFORMATION PLATE SYMBOLS

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1



2



3



4

1. Refer to the user manual for operational and safety issues with regards to this machine.
2. Dispose of the machine and electrical components correctly.
3. Eye protection must be worn when operating the machine.
4. Ear defenders must be worn when operating the machine.

# SPECIFICATION

Maximum hole cutting capacity in .2/.3C steel = 40mm dia. x 50mm deep  
Arbor bore = 19.05mm (3/4") dia.

Motor Unit	Element 40/1Perm	Element 40/3Perm
Voltages	110V 50-60Hz	230V 50-60Hz
Normal Full Load	1200W	
Size	210mm long 90mm wide	
Holding Force at 20°C with 25mm minimum plate thickness <b>The use on any material less than 1"m 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>	5000N	
Overall Dimensions	Element 40/1Perm	Element 40/3Perm
Height - maximum	530mm	
Height - minimum	450mm	
Width (including Capstan fitting)	185mm	
Length Overall (including Guard)	394mm	
Nett Weight	13kg	
Vibration total values (triax vector sum) in accordance with EN62841-1:	Vibration emission value (ah): 2.746m/s <sup>2</sup> Uncertainty (K):1.5m/s <sup>2</sup>	Vibration emission value (ah):2.466 m/s <sup>2</sup> Uncertainty (K):1.5m/s <sup>2</sup>
Level of sound pressure in accordance with EN62841-1:	Sound pressure (LpA): 90.6 dB(A) Acoustic power (LwA): 103.6dB(A) Uncertainty(K): 3dB(A)	Sound pressure (LpA): 89.6 dB(A) Acoustic power (LwA): 102.6 dB(A) Uncertainty(K): 3dB(A)

## Vibration and Noise

The declared vibration total value(s) and the declared noise emission value(s) have been measured in accordance with a standard test method and maybe used for comparing one tool with another. The declared vibration total value(s) and declared noise emission values(s) may also be used in a preliminary assessment of exposure. The vibration and noise emissions during actual use of the power tool can differ from the declared total value depending on the ways in which the tool is used and especially what kind of workpiece is being processed. The need to identify safety measures to protect the operator that are based on an estimation of exposure in the actual conditions of use (taking account of all parts of the operating cycle such as the times when the tool is switched off and when it is running idle in addition to the trigger time). Ear and eye defenders must be worn when operating this machine. Wear gloves to protect hands when operating the machine. These tools are UK designed and manufactured with globally sourced components and conform to the requirements of EEC Document HD.400.1 and BS.2769/84

**Suitable only for a single phase 50-60Hz 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**

# OPERATIONAL SAFETY PROCEDURES

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## READ BEFORE USING THE MACHINE

- Always take care when lifting and transporting this machine. The maximum lifting weight for one person is 25kgs. See Fig.1
- When using electrical tools, basic safety precautions should always be followed to reduce the risk of electric shock, fire, and personal injury.
- Ensure the magnet is OFF before plugging in the machine.
- 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, gases or in high risk environments. Failure to do so may result in personal injury.
- BEFORE activating the machine, inspect all electrical supply cables (including extension leads), and replace if damaged. DO NOT use if there are any signs of damage.
- Only use extension cables approved for site conditions.
- BEFORE activating the machine, ALWAYS check the correct function of all operational systems, switches, magnet etc.
- BEFORE operating, the machine MUST be securely restrained to a fixed independent feature (by using safety strap RD4329B, or other means) to reduce the potential free movement, should the magnet become detached from the work piece. Failure to do so may result in personal injury.
- ALWAYS wear approved eye protectors, ear defenders and recommended PPE at ALL times when operating the machine.
- Disconnect from power source when changing cutters or working on the machine.
- Cutters and swarf are sharp, ALWAYS ensure that hands are adequately protected when changing cutters or removing swarf. Use a tool or brush where necessary to remove any swarf or the cutter from the arbor.
- Before operating the machine, ALWAYS ensure cutter-retaining screws are secured tightly.
- Regularly clear the work area and machine of swarf and dirt, paying particular attention to the underside of the magnet base.
- ALWAYS remove tie, rings, watches and any loose adornments that might entangle with the rotating machinery before operating.
- ALWAYS ensure that long hair is securely enclosed by an approved restraint before operating the machine.
- Should the cutter become stuck in the work piece, stop the motor immediately to prevent personal injury. Disconnect from power source and turn arbor to and fro. DO NOT ATTEMPT TO FREE THE CUTTER BY SWITCHING THE MOTOR ON AND OFF. Wear safety gloves to remove the cutter from the arbor.
- If the machine is accidentally dropped, ALWAYS thoroughly examine the machine for signs of damage and check that it functions correctly BEFORE resuming drilling.
- Regularly inspect the machine and check for any damaged or loose parts.
- 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 enter 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 as the ejected slug may cause injury.
- When not in use ALWAYS store the machine in a safe and secure location.
- ALWAYS ensure that approved ROTABROACH™ agents conduct repairs.



**Fig 1.**

Always carry the machine using the carry handle

## OPERATIONAL 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, follow the control panel operation instructions.
- ALWAYS switch off the motor by depressing the MOTOR stop button.
- Apply light pressure when commencing the cut of 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.
- 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 the 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 do not use water diluted cutting oil. Rotabroach cutting fluid has been specially formulated to maximise the cutters performance. It is available in 1 litre (RD208) and 5 litre (RD229).

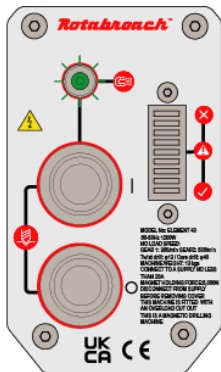
### coolant bottle



**Fig 2.**

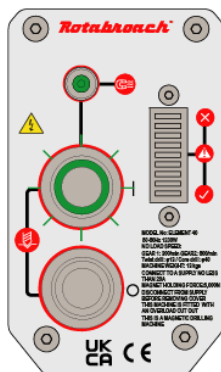
1. Unscrew the cap
2. Pour neat oil into the coolant bottle
3. Screw the cap back on the bottle firmly
4. Open the tap.

## CONTROL PANEL OPERATION



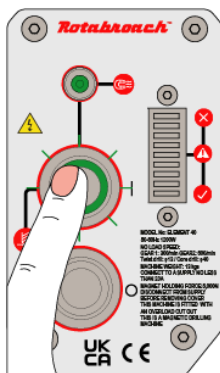
### 1) Magnet ON

Move the mechanical magnet switch, located on the back of the magnet to the ON position. The LED will light up either red or green depending on if sufficient magnetic adhesion has been achieved.



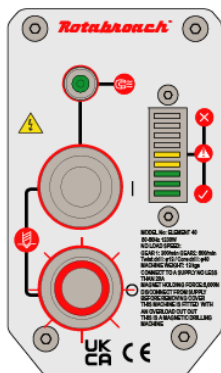
## 2) Motor switch

When the magnet is in the ON position, the GREEN switch will light up to indicate the motor is ready to start.



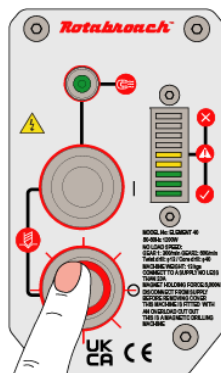
### 3) Magnet ON

Press the GREEN Switch to turn the motor on. Proceeds with cutting following all safety guidelines...



#### 4) Cutting

See next page for detailed  
description of the CutSmart™  
visual indicator.



### 1) Magnet OFF

To stop the motor, press the RED switch. The motor will stop, and the GREEN switch will turn on.

Go back to step 3 to start over.

# CUTSMART™ TECHNOLOGY

Designed for you to get the most out of your machine and your cutters. CutSmart has an easy to read panel that indicates when you are drilling with too much force, which will damage the machine and the cutters.

Allow the cutter to do the work and you will find that a much smoother hole and faster drilling time is achieved.



## GREEN ZONE

Perfect, try to keep in the green zone for the best cut and optimum machine performance.



## YELLOW ZONE

A little too much pressure on the drill ease off to get back to the green zone.



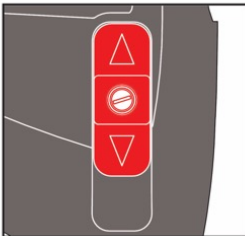
## RED ZONE

Overload: Back off immediately as too much force will cause the motor to cut off if you continue.

# GEAR SELECTION

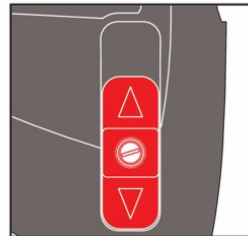
The Element 40 PERM magnetic drill is fitted with a 2 speed gearbox. The gear is used to reduce the output speed when using larger cutters.

Up to 30mm diameter cutters, gear position 1 should be used.  
30 – 40mm diameter cutters, gear position 2 should be used.



## Gear Position 1:

High speed up to 30mm diameter cutters.



## Gear Position 2:

Low speed 30mm to 40mm diameter cutters.

# EXTENSION CABLE SELECTION

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The machines are factory fitted with a 3-metre length of cable having three conductors 1.5mm<sup>2</sup> 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.

Should the mains cable become damaged and need replacing, please ensure this is carried out only by an approved Rotabroach Engineer.

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<sup>2</sup>

For 230v supply: 26metres of 3 core x 1.5mm<sup>2</sup>

**ALWAYS DISCONNECT THE MACHINE FROM THE POWER SOURCE  
BEFORE CHANGING CUTTERS**

## MOUNTING OF CUTTERS

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

**The following procedure is to be used when mounting cutters:**

- Lay the machine on its side with feed handles uppermost, ensuring arbor is wound down to its lowest point to enable access to socket screws RD4066.
- Take appropriate pilot and place through the hole in cutter shank. Insert shank of cutter into bore of arbor, ensuring alignment of two drive flats with socket screws.
- Tighten both screws using hexagon key.

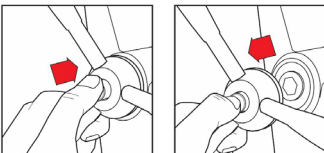
## CAPSTAN OPERATION

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The quick release capstan is a feature offers that offers the user simple dual side operation.

**To remove the capstan, simply do the following:**

1. Press in the central button on the capstan hub, holding onto the capstan arms.
2. With the button pressed in, pull the capstan away from the main body, holding on to the capstan arms.
3. Re-insert the hexagonal shaft into the hexagonal slot to attach the capstan.



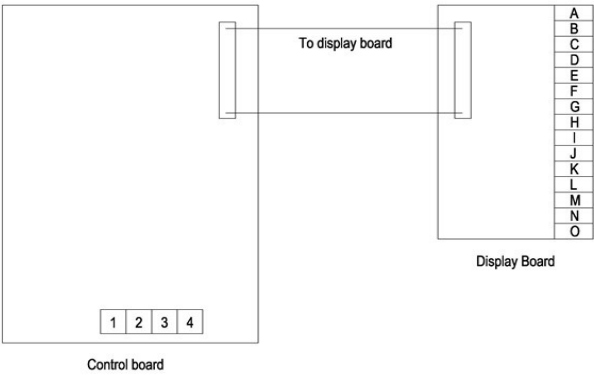
# REMEDIES FOR HOLE MAKING PROBLEMS

Problems	Cause	Remedy
1) Magnetic base won't hold effectively	<p>Material being cut may be too thin for efficient holding.</p> <p>Swarf or dirt under magnet.</p> <p>Irregularity on magnet contact or workpiece.</p> <p>Insufficient current going to magnet during drilling cycles.</p>	<p>Attach an additional piece of metal under the magnet, or mechanically clamp magnetic base to work-piece.</p> <p>Clean magnet.</p> <p>Use extreme care; file any imperfections flush to surface.</p> <p>Confirm power supply and output from control unit, check supply cable.</p>
2) Cutter skips out of centrepunch mark at initiation of cut	<p>Magnetic base is not holding effectively.</p> <p>Worn arbor bushing and/or ejector collar.</p> <p>Too much feed pressure at start of cut.</p> <p>Cutter is dull, 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 motor bushing support bracket, main casting or loose gib adjusting set screws.</p>	<p>See causes and remedies above.</p> <p>New arbor bushing is needed.</p> <p>Light pressure only is needed 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>
3) Excessive drilling pressure required	<p>Incorrectly re-sharpened, worn or chipped cutter.</p> <p>Coming down on swarf lying on surface of workpiece.</p> <p>Gib strips out of adjustment or lack of lubrication.</p> <p>Swarf accumulated (packed) inside cutter.</p>	<p>Re-sharpen or replace.</p> <p>Take care not to start a cut on swarf.</p> <p>Adjust setscrews and lubricate.</p> <p>Clear cutter.</p>

# REMEDIES FOR HOLE MAKING PROBLEMS CONT.

Problems	Cause	Remedy
4) Excessive cutter breakage	Steel swarf or dirt under cutter. Incorrectly re-sharpened or worn cutter. Cutter skipping. Slide needs adjustment. Cutter not attached tightly to arbor. Insufficient use of cutting oil or unsuitable type of oil. Incorrect speed	Remove cutter, clean part thoroughly and replace. Always have a new cutter on hand to refer to for correct tooth geometry, together with instruction sheet. See causes and remedies (2). Tighten grub screws supporting the slide. Retighten. Inject oil of light viscosity into the coolant-inducing ring and check that 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). Ensure correct gear is used for the cutter.
5) Excessive cutter wear	See cause and remedy above Incorrectly re-sharpened cutter. Insufficient or spasmodic cutting pressure.	Refer to instructions and a new cutter for proper tooth geometry. Use sufficient steady pressure to slow the drill down. This will result in optimum cutting speed and chip load.

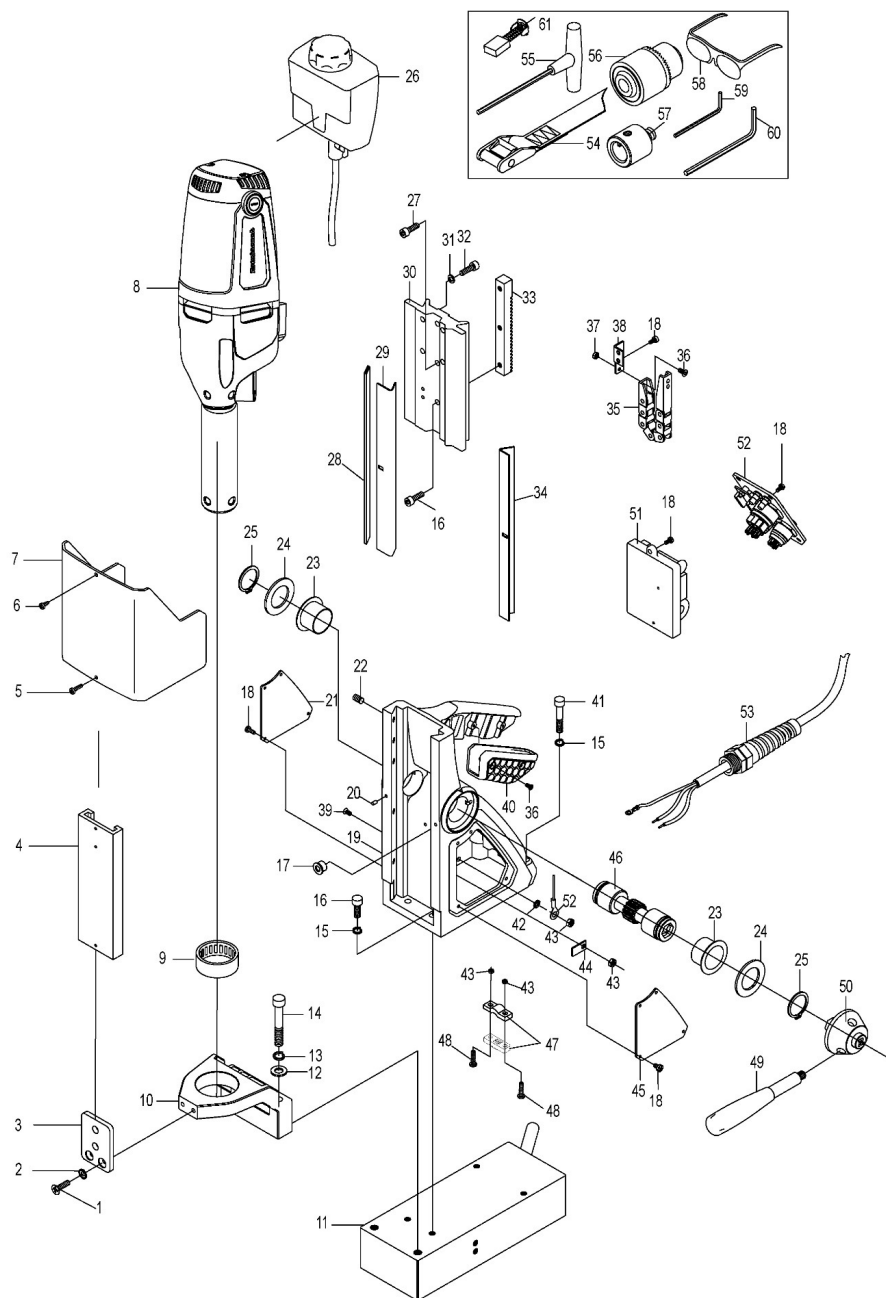
# WIRING DIAGRAM



No.	Function	Wire Colour
1	Mains Neutral Input	Blue
2	Motor Neutral Output	Black
3	Motor Live Output	Red
4	Mains Live Input	Brown

No.	Function	Wire Colour
A	Motor 'Stop' Switch 0V	White
B	Motor 'Stop' Switch +5V	White
C	Motor 'Start' Switch 0V	White
D	Motor 'Start' Switch +5V	White
E	N/A	
F	N/A	
G	Magnet 'ON' LED +5V	White + Green
H	Magnet 'ON' LED +5V	White + Red
I	Magnet 'ON' LED 0V	White + Brown
J	N/A	
K	N/A	
L	Motor 'Stop' LED 0V (Red)	White
M	Motor 'Stop' LED +12V (Red)	White
N	Motor 'Start' LED 0V (Green)	White
O	Motor 'Start' LED +12V (Green)	White

# EXPLODED VIEW OF MACHINES



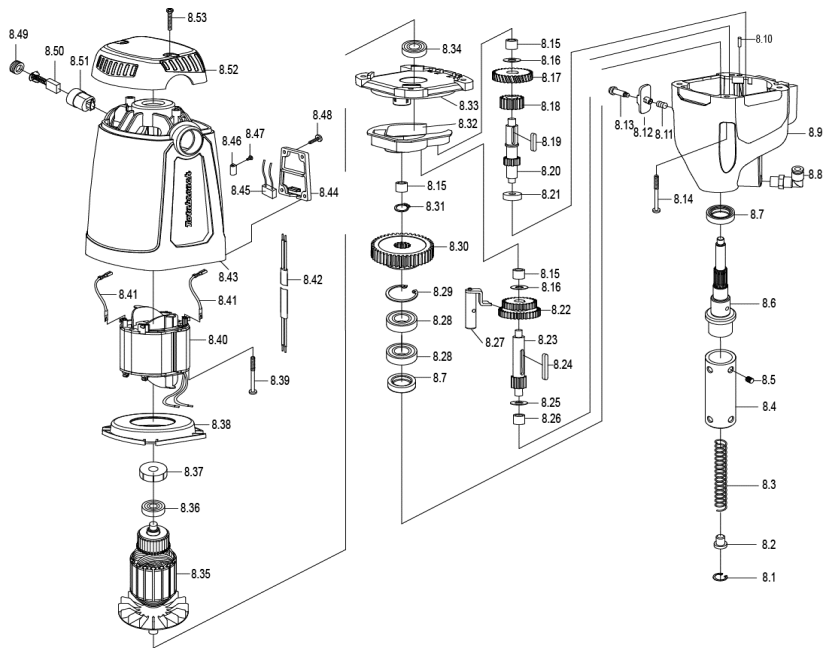


# PARTS LIST

Item No.	Rotabroach P/N	Description	Qty/Pcs
1	RD43131	Screw M5×16 CSK HD	2
2	RD45607	M5 CSK Washer	2
3	RDB3032	Guard Support	1
4	RDB3118	Slide Channel	1
5	RDA4201	Screw M4×14 BTTN HD	2
6	RDC4004	Screw M4×8 BTTN HD	1
7	RDB3037	Element E40 Guard	1
8	RDB2034/1(110V) RDC4054	Motor assembly	1
9	RD45624	Needle bearing HK3516	1
10	RDB3013	Bearing bracket	1
11	RDB3117	Magnet	1
12	RD4078	Washer	2
13	RD4079	spring washer	2
14	RD4277	Screw M8×50 CAP HD	2
15	RD4207	Spring washer	4
16	RD4098	Screw M6×20 CAP HD	4
17	RDA4005	Cable bush	1
18	RDA4021	Screw M4×8 BTTN HD	17
19	RDA3001	Main housing	1
20	RD45622	Straight pin	2
21	RDB3025PERM	Right side panel	1
22	RD4312	Grub Screw M6×12	5
23	RDA3092	Bush	2
24	RDA4006	Capstan Washer	2
25	RDA4004	Circlip	2
26	RDA4068	Coolant bottle assembly	1
27	RDA4029	Screw M6×16 CAP HD	1
28	RD33105	Gib support strip	1
29	RDA3038	Gib strip	1
30	RDB3035	Slide	1
31	RD4092	M5 Shakeproof washer	4
32	RD4091	Screw M5×22 CAP HD	4
33	RDB3027	Rack	1
34	RDA3037	Adjustable gib strip	1
35	RDB2013	Chain	1

Item No.	Rotabroach P/N	Description	Qty/Pcs
36	RDA4204	Screw M3×8 CSK HD	8
37	RDA4205	M3 Nut	4
38	RDB3045	Cable chain attachment	2
39	RDA4206	Screw M4×12 CSK HD	2
40	RDA5008	Handle insert	1
41	RD4206	Screw M6×38 CAP HD	2
42	RD4069	M4 Washer	1
43	RD4068	M4 nut	4
44	RD45604	Earth lable	1
45	RDB3026PERM	left side panel	1
46	RDA3012	Intermediate gear shaft	1
47	RDA4070	Cable clamp	1
48	RDA4071	Screw M4×18CAP HD	2
49	RDA2008	Capstan arm	3
50	RDA3015	Capstan Hub	1
51	RDB2031/1 RDB2031/3	PCB	1
52	RDB2034/1 RDB2034/3	Control panel assembly	1
52	RDB2034/1 RDB2034/3	Power chord	1
54	RD4329	Safety belt	1
55	RD4088	4mm hexagonal spanner	1
56	RD43099	Chuck	1
57	RD33153	Adapter	1
58	RDA3105	Safety glass	1
59	RD4152	3mm hexagonal spanner	1
60	RD4230	6mm hexagonal spanner	1
61	RDB3066	Carbon Brush(Pair)	1

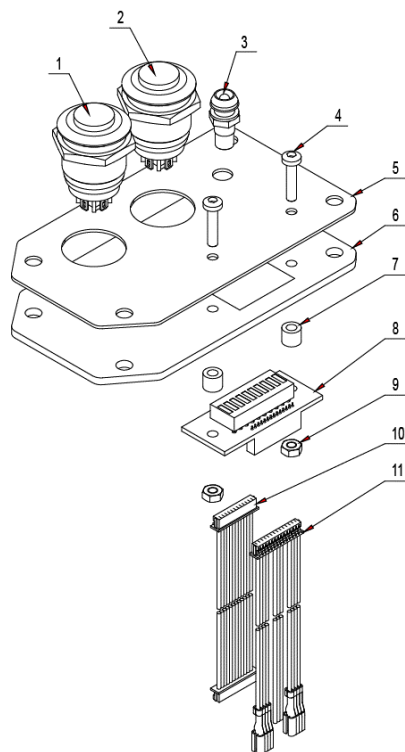
# EXPLODED VIEW OF MOTOR AND GEARBOX



Item No.	Rotabroach P/N	Description	Qty/Pcs
8.1	RD4056	Circlip	1
8.2	RA354	Button	1
8.3	RA3118	Spring	1
8.4	RDB3119	Arbor	1
8.5	RD4066	Grub Screw M8×8	6
8.6	RDB3020	Arbor spindle	1
8.7	RD43304	Oil seal	2
8.8	RDA4037	Fluid lever	1
8.9	RDB3005	Gear box	1
8.10	RD45614	Straight Pin	1
8.11	RDB4008	Spring	1
8.12	RDB3030	Gear lever	1
8.13	RDB4006	Gear lever M4 shoulder bolt	1
8.14	RDB4003	Tapping Screw ST4.8×45	4
8.15	RDB4001	Needle bearing HK0810	3

Item No.	Rotabroach P/N	Description	Qty/Pcs
8.16	RDB4002	Washer	2
8.17	RDB3049	Helical gear 31T 1.25M 15HA 30PA	1
8.18	RDB3043	17 tooth gear	1
8.19	RDB3050	Key steel 4x4x16	1
8.20	RDB3047	Gear axel	1
8.21	RM17134	Rolling bearing 608	1
8.22	RDB2022	Dual gear	1
8.23	RDB3046	Gear axel	1
8.24	RDB3048	Key steel	1
8.25	RDB4004	Gear shaft washer 10mm ID	1
8.26	RDB4005	Needle bearing HK1010	1
8.27	RDB2010	Gear lever shaft	1
8.28	RD43305	Rolling bearing 6003 RS	2
8.29	RD43306	Circlip	1
8.30	RDB2018	Drive gear assembly	1
8.31	RD43310	Circlip	1
8.32	RDB3031	Oil baffle plate	1
8.33	RDB3006	Gear plate	1
8.34	RD45522	Rolling bearing 6001 RS	1
8.35	RDB3060/3(230V)	Inductor	1
8.36	RDB3060/1(110V)	Armature	1
8.37	RD43603	Rolling bearing 629 RS	1
8.38	RDB3069	Bearing Sleeve	1
8.39	RD43625	Tapping screw ST4.2x65	2
8.40	RDB3061/3(230V) RDB3061/1(110V)	Field coil	1
8.41	RDB3065	Lead wire	2
8.42	RDB3068	Motor wire	1
8.43	RDB5002	Motor housing	1
8.44	RDA5018	Wire box cover	1
8.45	RDA3069	capacitor	1
8.46	RD35617	Terminal	2
8.47	RD45613	Screw M3x6 BTTN HD	4
8.48	RDA4034	Tapping Screw ST2.9x8	4
8.49	RD33616	Brush cap	2
8.5	RDB3066	Brush	2
8.51	RD33614	Brush hold	2
8.52	RDB5003	Top Cap	1
8.53	RDA4035	Tapping Screw	2

# CONTROL PANEL PARTS AND LIST



Item No.	Rotabroach P/N	Description	Qty/Pcs
1	RDA4052	Red Motor Switch	1
2	RDA4051	Green Motor Switch	1
3	RDC4093	Green LED	1
4	RDA4036	Screw M3 X 12 BTTN HD	2
5	RDB3121	Control Panel Cover	2
6	RDB3100PERM (110V) RDB3101PERM (230V)	Control Plate	1
7	RDA4019	Nylon Spacer	2
8	RDC4099	Array Board	1
9	RDA4205	M3 Nut	2
10	RDA4083	Connection line	1
11	RDB4010	Connection line	1

# FITTING THE CHUCK

- To remove the arbor lay the machine on its side.
- Unscrew the two grub screws at the top of the arbor.
- When the arbor has become detached from the spindle this can then be removed.
- Remove the arbor support bracket and guard with the arbor retained.
- Mount the chuck using the chuck adaptor RD33153.
- Replacing the chuck is the reverse sequence.

# MAINTENANCE

In order to 'get the best life' out of your Rotabroach machine always keep it in good working order.

A number of items must always be checked on Rotabroach machines.

Always before starting any job make sure the machine is in good working order and that there are no damaged or loose parts. Any loose parts must be tightened.

**Before proceeding with any maintenance work be certain that the power supply is disconnected.**

Description	Every Operation	1 Week	1 Month
Visual check of machine for damage	X		
Operation of machine	X		
Check brush wear		X	
Check magnetic base	X		
Check alignment of the machine			X
Check grease			X
Check armature			X

## Visually check the machine for damage.

The machine must be checked before operation for any signs of damage that will affect the operation of the machine. Particular notice must be taken to the mains cable, if the machine appears to be damaged it should not be used, failure to do so may cause injury or death.

## Check operation of the machine.

The machines operation must be checked to ensure that all components are working correctly.

## Machine Brushes

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

### **Magnetic base**

Before every operation the magnetic base should be checked to make sure that the base is flat and there is no damage present. An uneven magnet base will cause the magnet not to hold as efficiently and may cause injury to the operator.

### **Adjustment of slide and bearing bracket alignment.**

An essential requirement of the machine is that the slide can move in a smooth and controlled manner, free of lateral movement and vibration.

This situation can be maintained by periodic adjustment of the slide and is accomplished in the following manner:

1. Place the machine in an upright position and, by means of the capstan, raise the slide to its highest position. Clean the brass gib strips and apply a small amount of light machine oil to the wear surfaces.
2. Now lower the slide back to its lowest position. Bring the slide into the center of the dovetail slide housing and loosen screws thus allowing free movement of the arbor support bracket.
3. Commencing with the middle screws, gently feed in all the screws until slight resistance is encountered.
4. Operate the slide up and down a few times to test the movement and make any further necessary adjustments. Try to ensure that all the screws are exerting a uniform pressure on the slide from top to bottom. A perfectly adjusted slide will operate freely up and down without any sideways movement.
5. Now raise the slide to its highest position. Slightly undo the arbor bearing bracket and, using fingers only, tighten the screws.
6. Place the machine on a steel plate, connect to power supply and switch on the magnet. Start up the motor. If the arbor is incorrectly aligned, the arbor support bracket will be seen to oscillate. Make any necessary further adjustments to the bracket to ensure correct alignment of the spindle and finally tighten the screws using a spanner. Lastly tighten the arbor bearing bracket.

### **Check machines grease.**

The gearbox grease should be checked once a month to ensure all moving components are covered to prevent wear. The grease should be changed at least once a year to ensure you gain the best from your machine.

### **Check Armature of the machine.**

This should be checked at least once a month to check that there are no visual signs of damage to the body or to the commutator. Some signs of wear will be seen on the commutator over a period but this is normal (this is the part that comes into contact with the brushes) however, if there are any signs of abnormal damage the part should be replaced.

# TROUBLE SHOOTING

Magnet and motor do not function	<ul style="list-style-type: none"> <li>- The magnet switch is not connected to the power supply</li> <li>- Damaged or defective wiring</li> <li>- Defective fuse</li> <li>- Defective magnet switch</li> <li>- Defective control unit</li> <li>- Defective power supply</li> </ul>
Magnet does function, the motor does not	<ul style="list-style-type: none"> <li>- Damaged or defective wiring</li> <li>- Carbon brushes are stuck or worn out</li> <li>- Defective magnet switch</li> <li>- Defective on / off switch</li> <li>- Defective control unit</li> <li>- Defective armature and/or field</li> <li>- Defective protective reed switch</li> </ul>
Magnet does not function, the motor does	<ul style="list-style-type: none"> <li>- Defective magnet</li> <li>- Defective fuse</li> <li>- Defective control unit</li> </ul>
Hole cutters break quickly, holes are bigger than the hole cutter	<ul style="list-style-type: none"> <li>- Play in the guide</li> <li>- Bent spindle</li> <li>- Shaft extending from the motor is bent</li> <li>- Pilot bent</li> </ul>
Motor running roughly and/or seizing up	<ul style="list-style-type: none"> <li>- Bent spindle</li> <li>- Shaft extending from the motor is bent</li> <li>- Triangular guide not mounted straight</li> <li>- Dirt between spindle and triangular guide</li> </ul>
Motor making a rattling sound	<ul style="list-style-type: none"> <li>- Gear ring (bottom of the armature) worn out</li> <li>- Gear(s) worn out</li> <li>- No grease in gear box</li> </ul>
Motor humming, big sparks and motor has no force	<ul style="list-style-type: none"> <li>- Armature damaged</li> <li>- Field burned</li> <li>- Carbon brushes worn out</li> </ul>
Motor does not start or fails.	<ul style="list-style-type: none"> <li>- Damaged or defective wiring</li> <li>- Damage to armature or field coil</li> <li>- Damaged or defective brushes</li> </ul>
Guiding takes a great deal of effort	<ul style="list-style-type: none"> <li>- Guide is set too tight</li> <li>- Guide is dry</li> <li>- Guide/gear- rack/rotation system is dirty or damaged</li> </ul>



Insufficient magnetic force	<ul style="list-style-type: none"> <li>- Damaged or defective wiring</li> <li>- Bottom of magnet not clean and dry</li> <li>- Bottom of magnet not flat</li> <li>- Work piece is not bare metal</li> <li>- Work piece is not flat</li> <li>- Work piece is too thin less than 3/8"</li> <li>- Defective control unit</li> <li>- Defective magnet</li> </ul>
Frame under voltage	<ul style="list-style-type: none"> <li>- Damaged / defective wiring</li> <li>- Defective magnet</li> <li>- Motor seriously dirty</li> </ul>
Fuse blows when magnet switch is turned on	<ul style="list-style-type: none"> <li>- Damaged or defective wiring</li> <li>- Wrong value fuse</li> <li>- Defective magnet switch</li> <li>- Defective control unit</li> <li>- Defective magnet</li> </ul>
Fuse blows when motor is started up	<ul style="list-style-type: none"> <li>- Damaged or defective wiring</li> <li>- Wrong value fuse</li> <li>- Motor running roughly</li> <li>- Defective armature and / or field</li> <li>- Carbon brushes worn out</li> <li>- Defective control unit</li> </ul>
Rotation system free stroke too long	<ul style="list-style-type: none"> <li>- Loose or defective gear-rack</li> <li>- Defective rotation system</li> </ul>

# CUTTING SELECTION AND SPEEDS

Material	Material Hardness	Cutter
Mild and free cutting steels	<700N/mm <sup>2</sup>	RAP or RAPL
Mild and free cutting steels	<850N/mm <sup>2</sup>	SRCV or SRCVL
Steel angle and joists	<700N/mm <sup>2</sup>	RAP or RAPL
Steel angle and joists	<850N/mm <sup>2</sup>	SRCV or SRCVL
Plate and sheet steel	<700N/mm <sup>2</sup>	RAP or RAPL
Plate and sheet steel	<850N/mm <sup>2</sup>	SRCV or SRCVL
Aluminium	<750Nmm <sup>2</sup>	RAP or RAPL
Aluminium	<850N/mm <sup>2</sup>	SRCV or SRCVL
Brass	<700N/mm <sup>2</sup>	RAP or RAPL
Brass	<850N/mm <sup>2</sup>	SRCV or SRCVL
Cast iron	<700N/mm <sup>2</sup>	RAP or RAPL
Cast iron	<850N/mm <sup>2</sup>	SRCV or SRCVL
Stainless steel	<700N/mm <sup>2</sup>	RAP or RAPL
Stainless steel	<850N/mm <sup>2</sup>	SRCV or SRCVL
Stainless steel	>850N/mm <sup>2</sup>	CWC to CWCX
Rail track	>850N/mm <sup>2</sup>	SCRWC or SCRWCL
Tool steel	>850N/mm <sup>2</sup>	CWC to CWCX
Die Steel	>850N/mm <sup>2</sup>	CWC to CWCX

The data listed below is for reference purpose only, and indicate potential starting conditions. It is the responsibility of the site operation manager to determine correct application requirements.

<b>Retabroach</b>	<b>Cutting surface speed Meters/min</b>	<b>Cutter diameter/Material/RPM relationship</b>													
		13		14		18		22		30		50		65	
	Lower - Upper	L	U	L	U	L	U	L	U	L	U	L	U	L	U
<b>Aluminium</b>	60 - 90	1469	2203	1364	2046	1061	1591	868	1302	637	955	382	573	294	441
<b>Brass &amp; Bronze</b>	40 - 50	979	1224	909	1137	707	884	579	723	424	530	255	318	196	245
<b>Iron: cast(soft)</b>	30 - 50	734	1224	682	1137	530	884	434	723	318	530	191	318	147	245
cast(hard)	15 - 21	367	514	341	477	265	371	217	304	159	223	95	134	73	103
cast(malleable)	15 - 30	367	734	341	682	265	530	217	434	159	318	95	191	73	147
<b>Steel: mild</b>	24 - 30	588	734	546	682	424	530	347	434	255	318	153	191	118	147
high tensile	3 - 5	73	122	68	114	53	88	43	72	32	53	19	32	15	24
stainless (free cutting)	15 - 18	367	441	341	409	265	318	217	260	159	191	95	115	73	88
stainless (heat resisting)	6 - 13	26	318	136	296	106	230	87	188	64	138	38	83	29	64

These are only starting points. They will vary with application and work piece condition.

<b>Material or Application Type</b>	<b>Feed per Tooth (mm)</b>
Thin Walled Workpieces Oblique Entry / Curved Surfaces Semi-Circles / Fragile Setups	0.0254 / 0.0508 (0.0762 FPT with Work Hardening Materials)
Soft / Gummy Materials	0.1016 / 0.127
Typical / Average Applications	0.0762 / 0.1016
Deep Holes	0.1016 / 0.127

Difficult-to-machine materials will require reduced feed rates.

# WARRANTY AND CE STATEMENTS

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Rotabroach™ warrants its machines to be free from faulty materials, under normal usage of machines, for a period of 12 months from initial date of purchase. All other parts (excluding cutters) are under warranty for 90 days, provided that the warranty registration card (or online registration) has been completed and returned to Rotabroach™ or its designated distributor within a period of (30) days from the purchase date. Failure to do so will void the warranty. If the stated is adhered to, Rotabroach™ will repair or replace (at its option) without charge any faulty items returned.

## **This Warranty does not cover:**

1. Components that are subject to natural wear and tear caused by the use not in accordance with the operators instructions
2. Defects in the tool caused by non-compliance with the operating instructions, improper use, abnormal environment conditions, inappropriate operating conditions overload or insufficient servicing or maintenance.
3. Defects caused by using accessories, components or spare parts other than original Rotabroach™ parts.
4. Tools to which changes or additions have been made.
5. Electrical components are subject to manufacturer's warranty.

Your online registration can be submitted at [www.rotabroach.co.uk](http://www.rotabroach.co.uk)

The warranty claim must be logged within the warranty period. This requires the submission or sending of the complete tool in question with the original sales receipt which must indicate the purchase date of the product. A complaint form must also be submitted prior to the return.

This can be found online at [www.rotabroach.co.uk](http://www.rotabroach.co.uk). Failure to complete this form will result in the delay of your claim.

All goods returned defective must be returned pre-paid to Rotabroach™, in no event shall Rotabroach™ be liable for subsequent direct, or indirect loss or damage.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, (EXPRESSED OR IMPLIED) INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

ROTABROACH™ RESERVE THE RIGHT TO MAKE IMPROVEMENTS AND MODIFICATIONS TO DESIGN WITHOUT PRIOR NOTICE.

**Known and Trusted Worldwide for Quality, Performance and Reliability**

# EC DECLARATION OF CONFORMITY

Based on the referenced test reports, the below product has been found to comply with the relevant harmonised standard(s) to the directive(s) listed on this verification at the time the tests were carried out.

Name and address of manufacturer:	Rotabroach Ltd Burgess Road, Sheffield Road, Sheffield S9 3WD, United Kingdom
Product tested:	ELEMENT 40/1PERM ELEMENT 40/3PERM
Application of Product:	Hole Drilling Metal
Relevant standards/directives	EN127172001+A12009 The EMC Directive 2014/30/EU The Machinery Directive 2006/42/EC – Annex I EN 62841-1:2015 EN55014-1:2017 EN55014-2:2015 EN61000-3-2:2014 EN61000-3-3:2013
Name and Address of Responsible person:	Mr Mathew Grey Managing Director Burgess Road, Sheffield S9 3WD, United Kingdom
Date:	20th August 2021
Signature:	

