

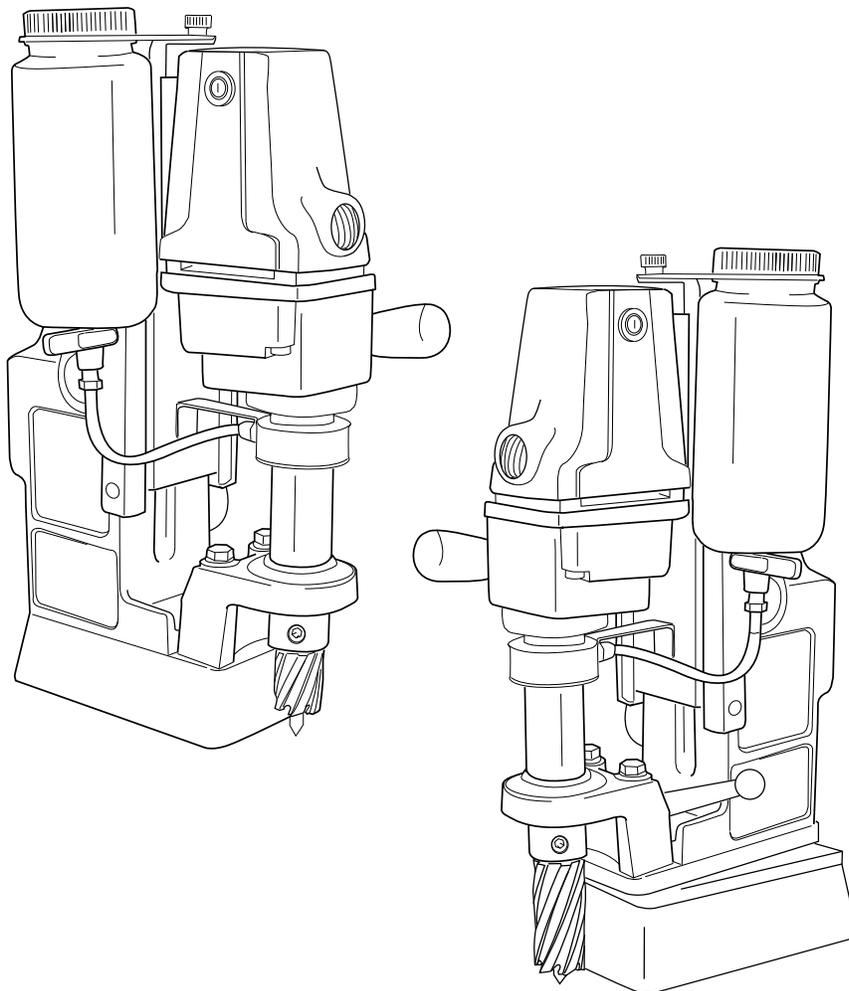


HMD938 SERIES

PORTABLE MAGNETIC DRILLS

OPERATOR'S MANUAL

COVERS DRILL PART NUMBERS 0938402 & 0938404



FOR USE WITH "12,000-SERIES" HOUGEN[®] CUTTERS

HOUGEN®

Portable Magnetic Drills

Model HMD938 Series

Welcome to Hougen

Congratulations on your purchase of the Hougen® Portable Magnetic Drill. Your model is designed to produce superior holes quickly and efficiently. Through constant innovation and development, Hougen is committed to provide you with hole-producing tools and products to help you be more productive.

Before attempting to operate your new Portable Magnetic Drill, please read all instructions first. These include the Operator's Manual and Warning Label on the unit itself. With proper use, care, and maintenance, your model will provide you with years of effective hole drilling performance. Once again, thank you for selecting our product and welcome to Hougen.

Listed below are the Part Numbers and Descriptions of the Hougen HMD938 Series .

0938402 (HMD938) is 230 volt with coolant for Singapore.

0938404 (HMD938S) is 230 volt with coolant and a Swivel Base for Singapore.

COM. / IND. LIMITED WARRANTY

Hougen Manufacturing, Incorporated warrants its Portable Magnetic Drills, Electro-hydraulic Hole Punchers, and Tornado II Paint Shake

or workmanship and will repair or replace (at its option) without charge any items returned. This warranty is void if the item has

or workmanship. No other expressed warranty is given or authorized. Hougen Manufacturing, Inc. disclaims any implied warranty of MERCHANTABILITY or FITNESS for any period beyond the expressed warranty and shall not be liable for incidental

an

to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

To obtain warranty service, return the item(s), transportation prepaid, to your nearest Factory Authorized Warranty Repair Center or to Hougen Manufacturing, Inc., 3001 Hougen Drive, Swartz Creek, Michigan 48473.

Hougen Drills are warranted against manufacturing defects only. Subject to Hougen Manufacturing inspection.

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

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HOUGEN PATENT NOTICE

The products in this manual may be covered by one or more of the following U.S. patents, foreign patents, and pending patents:

5902076

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Drillmate PTY, Ltd.

UNPACKING YOUR NEW MAGNETIC DRILL

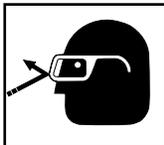
1. Open shipping carton and remove the literature and hardware packages.
2. **Read and Follow All Instructions** before attempting to operate your new Magnetic Drill.
3. Complete and mail the Product Registration Card now. It is important that Hougen Manufacturing, Inc. have a record of product ownership.
4. Open hardware package and check contents.
 - 10565 1/8" Hex wrench for Gib Adjustment
 - 04558 Feed handles (3)
 - 04532 Feed handle knobs (3)
 - 10506 Set screw for cutter installation (2)
 - 10730 Safety chain
 - 02635 Hex wrench for cutter installation
 - 13013 5/32" Hex wrench
5. Using the handle of Magnetic Drill, lift unit out of the shipping case.
6. Remove all packing and securing material from the drill unit.
7. Screw the three Knobs (04532) into the three Feed Handles (04558) and then screw Handles into the Hub Assembly (40254).
8. Your Magnetic Drill was factory adjusted prior to shipping. Check to make sure that all gib adjustment screws, motor mount screws, front support bracket screws, and magnet mounting screws are snug and have not vibrated loose in transit.
9. Your new Magnetic Drill comes complete with arbor mounted. The 3/4" diameter arbor bore fits all 3/4"-shank "12,000-Series" Hougen Cutters.

Reread Safety Warnings listed in the Operator's Manual and on the drill unit to avoid injury. Follow operating procedures.

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SAFETY FIRST



Always wear eye protection while using cutting tools, or in the vicinity of cutting.



CAUTION! The slug is ejected at the end of the cut. Do not aim cutter or arbor so that ejected slug may hit someone around, or below you.



CAUTION! Cutters are sharp. Wear gloves when installing or removing cutter from arbor. Do not grab a rotating cutter.



CAUTION! To prevent electric shock, do not use power tools near wet areas, or where power tool may become wet.

Important Safety Instructions



WARNING: When using electric tools, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury, including the following:

1. Read All Instructions

2. Grounding Instructions

This tool should be grounded while in use to protect the operator from electric shock. The tool is equipped with a 3-conductor cord and a 3-prong grounding type plug to fit the proper grounding type receptacle. The green (or green and yellow) conductor in the cord is the grounding wire. Never connect the green (or green and yellow) wire to a live terminal. (Refer to Plug Diagram) Section A

3. Safe Electrical Connection

Your Mag Drill is rated for use on 115VAC (Plug A) or 230V (Plug B) at 50-60Hz. Do not attempt to use drill on power sources rated other than this. Wet electrical connections are shock hazards. To prevent the cutting fluid from traveling along the cord and contacting the plug or power outlet, tie a drip loop in the power cord. Also elevate extension cords or gang box connections.

4. Extension Cords

Use only 3-wire extension cords that have 3-prong grounding type plugs and 3-pole receptacles that accept the tool's plug. Replace or repair damaged cords. Make sure the conductor size is large enough to prevent excessive voltage drop which will cause loss of power and possible motor damage.

5. Do Not Force Tool

It will do the job better and faster at the rate for which it was intended.

6. Keep Work Area Clean

Cluttered areas and benches invite injuries. Keep dirt and chips from under the Cutter area.

7. Consider Work Area Environment

Do not expose tool to rain.
Do not use tool in damp or wet locations.
Keep work area well lit.
Do not use tool in presence of flammable liquids or gases. Disconnect from power source when changing cutters or maintaining drill.

8. Guard Against Electric Shock

Prevent body contact with grounded surfaces. For example: pipes, radiators, ranges, refrigerator enclosures.

9. Keep Children Away

Do not let visitors contact tool. All visitors should be kept away from work area while in use.

10. Store Idle Tools

When not in use, tools should be stored in a dry, and high or locked-up place — out of reach of children.

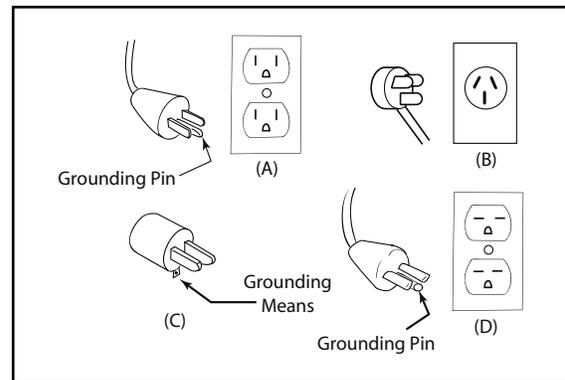
11. Use Right Tool

Do not force small tool or attachment to do the job of a heavy duty tool.
Do not use tool for purpose not intended — for example — do not use a circular saw for cutting tree limbs or logs.

Extension Cord Table

LENGTH OF CORD, FEET	RECOMMENDED WIRE GAUGE	RECOMMENDED WIRE GAUGE
	115V MOTOR 10 - 12 AMPS	230 V MOTOR 5 - 6 AMPS
UP TO 25	16	18
26 - 50	14	18
51 - 100	10	16
101 - 200	8	14
201 - 300	6	12
301 - 500	4	10

Plugs and Receptacles



12. Non-Conforming Cutting Tools

Your Mag Drill is designed to use Houghen Cutters. The use of drilling tools having different shank styles is not recommended as they may not tighten securely in the drill arbor with risk of accident or injury.

13. Secure Work

Use clamps or a vise to hold work. It is safer than using your hand and it frees both hands to operate tool.

14. Always Wear Safety Glasses or Goggles

15. Dress Properly

Do not wear loose clothing or jewelry. They might entangle with spinning chips or get caught in moving parts. Rubber gloves and nonskid foot wear are recommended when working outdoors. Wear sturdy leather gloves when working indoors. Wear protective hair covering to contain long hair.

16. Do Not Abuse Cord

Never carry drill unit by its cord or yank it to disconnect from receptacle. Keep cord away from heat, oil, and sharp edges.

17. Do Not Overreach

Keep proper footing and balance at all time.

Important Safety Instructions - Continued

18. Maintain Tools With Care

Keep tools sharp and clean for better and safer performance. Do not use dull or broken Hougén Cutters. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and, if damaged, have repaired by authorized service facility. Inspect extension cords periodically and, if damaged, have repaired by authorized service facility. Keep handles dry, clean, and free from oil and grease.

19. Disconnect Tools

Disconnect when not in use, before servicing, and when changing cutters or accessories.

20. Remove Adjusting Keys and Wrenches

Form a habit of checking to see that keys and wrenches are removed from tool before turning it on.

21. Check Damaged Parts

Before further use of the drill, a part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A part that is damaged should be properly repaired or replaced by an authorized service center unless otherwise indicated elsewhere in this operator manual. Do not operate tool if switch does not turn it on and off.

22. Stay Alert

Watch what you are doing and use common sense. Do not operate tool when you are tired. Have defective switches replaced by authorized service center.

23. Outdoor Use Extension Cords

When tool is used outdoors, use only extension cords intended for use outdoors and so marked.

24. Additional Safety Precautions

Arbor and cutter should never be used as a hand-hold. Keep hands and clothing away from all moving parts. Do not use Hougén Cutters where ejected slug might cause injury (slug ejected at end of cut). Also, adhere to all operating instructions. Do not drill through any surface that may contain live electrical wiring. Drilling into a live wire could cause exposed metal parts of the drill to be made live. Remove chips wrapped around Cutter and arbor after each hole. With motor off and power disconnected, grasp chips with leather gloved hand or pliers and pull while rotating counterclockwise. Should the cutter become jammed in the work, stop the unit immediately to prevent personal injury. Disconnect the drill from the power supply and loosen jammed cutter by turning the arbor counterclockwise. Never attempt to free the jammed cutter by starting the motor. Service at authorized repair center only.

25. Operating Near Welding Equipment

DO NOT operate this unit on the same work surface that welding is being performed on. Severe damage to the unit, particularly the power cord, could occur. This could also result in personal injury to the operator.

26. Circuit Breaker

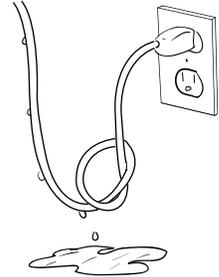
Changing of the circuit breaker to a higher amp rated breaker, or bypassing the circuit breaker is not recommended and will void product warranty.

27. Circuit Breaker Operation

The circuit breaker is a thermal breaker. When it reaches the higher temperature rating it will trip and cause the unit to shut down. This is a protective device and can be reset after 5 to 10. To reset the breaker, press the breaker button back in. If it does not reset, let the unit cool a little longer until you can push the button in and it stays in position.

28. Safe Electrical Connection

Wet electrical connections are shock hazards. To prevent the cutting fluid from traveling along the cord and contacting the plug or power outlet, tie a drip loop as shown. Also elevate extension cords or gang box connections.



29. Save these Instructions.

SAFETY SWITCH INDICATOR LIGHT

The Safety Switch Indicator Light is a Standard Safety Feature on HMD938 magnetic drills. Its purpose is to inform the user that an unsafe condition exists.

If light is Green:

In normal operation the safety switch light will be green. Motor "On" and "Off" Switches function normally.

If light is Red:

A condition with the safety switch exists that needs to be corrected.

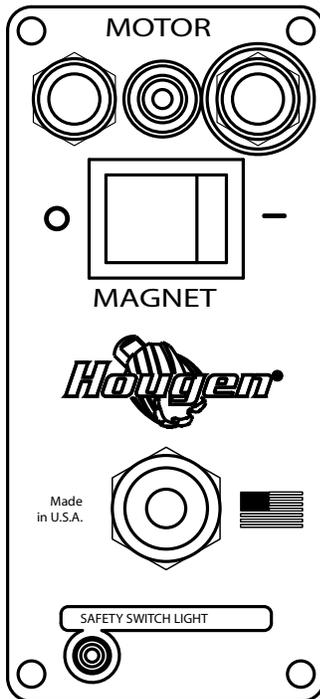
Possible causes:

- Safety Switch is defective. Have drill serviced.
- Uneven work surface or material. Check work surface for flatness.
- Dirt or chips under magnet. Clean work surface.

HOUGEN MANUFACTURING RECOMMENDS THAT CONDITIONS ARE CORRECTED SO LIGHT TURNS GREEN. THIS ALLOWS FOR THE UNIT TO BE OPERATED IN A SAFE MANNER.

For any questions please contact Hougén Manufacturing's Technical Service at (810) 635-7111.

OPERATION OF CONTROLS BEFORE INSTALLING HOUGEN CUTTER



CONTROL PANEL SWITCH PLATE
FIGURE 2

IMPORTANT: Before turning on the machine, it is important that the operator understands the interrelated functions of the **SAFETY SWITCH, MAGNET SWITCH, AND MOTOR SWITCHES.**

*READ SAFETY SWITCH INDICATOR LIGHT INSTRUCTIONS
ON PREVIOUS PAGE.*

SAFETY SWITCH — Located in base of drill. Enables motor operation only when magnet is properly seated on a clean and flat work surface. Turns motor off if switch detects lift of unit.

MAGNET ON/OFF SWITCHES — Energizes and De-energizes the magnetic base and activates the safety switch. Motor can now be started by pushing the motor **START** switch.

MOTOR START/STOP SWITCH — Starts and stops the motor (See instructions previous page).

1. Place Magnetic Drill on clean, flat steel plate that is at least 9.5mm thick.
2. Plug unit into proper AC power source. **DO NOT use with DC Power.**
3. Locate the Magnet **ON** and **OFF** switch and the motor **STOP** and **START** switch (Fig. 2).
4. **NOTE: A loss of power will de-energize the magnetic base and deactivate the motor. When power is restored, the magnet will reenergize, however, the motor START switch must be depressed before the motor will start.**

OPERATING INSTRUCTIONS

Always remember that the magnet's holding power is directly related to the workpiece thickness and surface condition. (Rating of 748 Kg pull is based on test using a 25mm thick ground surface.) Since magnetic attraction diminishes with thinner material or rough surfaces, mechanical clamping of drill unit to the workpiece should be used when cutting thin material (9.5mm or less) or material with uneven surfaces.

1. Make sure workpiece and bottom of magnet are free of chips, oil, etc.
2. Position drill by sliding it and gently feeding Arbor so that pilot point is touching center of hole to be drilled.
3. **Secure unit to workpiece with safety chain.**
4. Turn magnet ON by pressing the magnet ON switch.
5. Turn Feed Handle, raising the cutter until the pilot is above the work surface.
6. Make certain that cutter is clear of workpiece and turn motor ON by pressing the motor START switch.
7. Feed Hougen Cutter slowly into workpiece. Only after cutting path is established to a depth of about 2mm can full force be applied to feed handles.
8. Ease up on feed pressure as cutter starts breaking through.
9. At conclusion of cut, turn motor OFF by pressing motor STOP switch. Turn Feed Handles to raise Arbor thereby ejecting the slug if it hasn't already fallen free.
10. Turn magnet OFF by pressing the magnet OFF switch.
11. **Disconnect from power source.**
12. If necessary, remove chips from cutter and magnet, preferably wearing leather work gloves and/or with pliers. Disconnect safety chain and you are ready to move unit to new drilling position.

INSTALLING HOUGEN CUTTER IN ARBOR

1. Disconnect from power source.
2. Lay drill on its side with feed handles up or be sure Arbor clears table if unit is in normal operating position.
3. Turn Feed Handles until cutter mounting set screws are exposed and completely remove the set screw.
4. Insert proper pilot in shank end of Hougen Cutter.
5. Insert Hougen Cutter until flat on cutter shank is aligned with set screw holes and is exactly perpendicular to axis of set screw holes.
6. Insert set screws and tighten. Check to be certain that cutter is secure.

ADJUSTMENT OF GIBS

1. Loosen all Gib Screws (40237).
2. Feed the drill in and out a few times and then, with top of motor slide flush with top of housing, tighten the Gib Screws until you feel them touch the Steel Gib (02431).
3. Feed the drill in and out again.
4. Adjust Gib Screws so that there is uniform pressure from top to bottom. (Top of motor slide flush with top of housing.)
5. Turn each Gib Screw in about 1/8 to 1/4 turn, depending upon your preference.
6. Gibs should be tight enough so that slide moves up and down smoothly with no wobble or shaking. (Looseness will cause cutter breakage.)

NOTE: Gibs should be lubricated regularly with general purpose grease.

ARBOR ADJUSTMENT

Adjust Gibs before adjusting front support bracket.

1. Loosen Arbor Support Bracket Bolts.
2. Be sure top of arbor is flush with the shoulder on motor output shaft. Also make certain arbor is securely fastened.
3. Turn feed handle until motor and spindle are at the bottom of their travel.
4. Tighten Arbor Support Bolts.
5. Feed slide up and down a few times, checking for free and uniform movement.

NOTE: Check Arbor support bolts regularly to make certain they are tight. Tighten as required.

MAINTENANCE

In order to minimize wear on moving parts and to insure smoother operation and longer life for your magnetic drill, the following maintenance should be done periodically, based on use

1. Regularly tighten all fasteners and replace all worn parts.
2. Check motor brushes and replace if worn. (Break in period - 30 minutes at no load speed)
3. Check power cord and cord from panel to motor and, if cracked or frayed, return to an authorized repair center for replacement.
4. Apply grease to the slide dovetails, brass gibs, and the feed gear rack. For best results use Shell Cyprina-RA or equivalent.
5. Remove arbor and pack the bearing in the front support bracket with grease. Use Shell Cyprina-RA or equivalent.

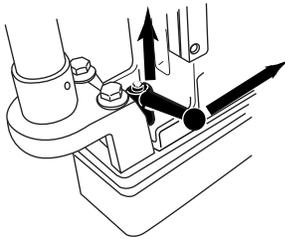
ATTENTION

The threads on the Clamp Handle Assembly are a Left Handed thread meaning,
Turning Clockwise would loosen the assembly
Turning Counter Clockwise would tighten the assembly.

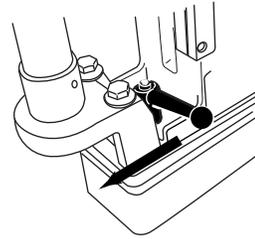
Also, the Clamp Handle Assembly is spring loaded so you will need to lift & turn the entire
Clamp Handle Assembly when repositioning as if to be a ratchet device.

To Loosen the Swivel Plate Assembly

1. Lift the Clamp Handle Assembly, rotated counter-clockwise and release .
This will reposition the lever for more movement.



2. With the Clamp Handle Assembly now down, pull the Clamp Handle Assembly clockwise.



With this being a left handed thread this will loosen this assembly.

3. If more travel is needed lift the Clamp Handle Assembly, rotate counter clockwise and release.

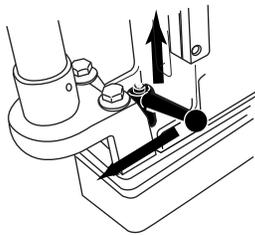
4. Pull the Clamp Handle Assembly clockwise again.

This amount of movement should be adequate to reposition the Drill Assembly.

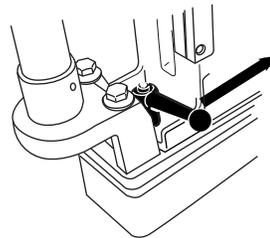
More movement than this may cause the Magnet Assembly to disengage from the drill base.

To Tighten the Swivel Plate Assembly.

1. Lift the Clamp Handle Assembly, rotated clockwise and release .
This will reposition the lever for more movement.



2. With the Clamp Handle Assembly now down, push the Clamp Handle Assembly counter clockwise.



With this being a left handed thread this will tighten this assembly.

3. If more travel is needed lift the Clamp Handle Assembly, rotate clockwise and release.

4. Push the Clamp Handle Assembly counter clockwise again.

Continue this process until the Swivel Assembly is tight.

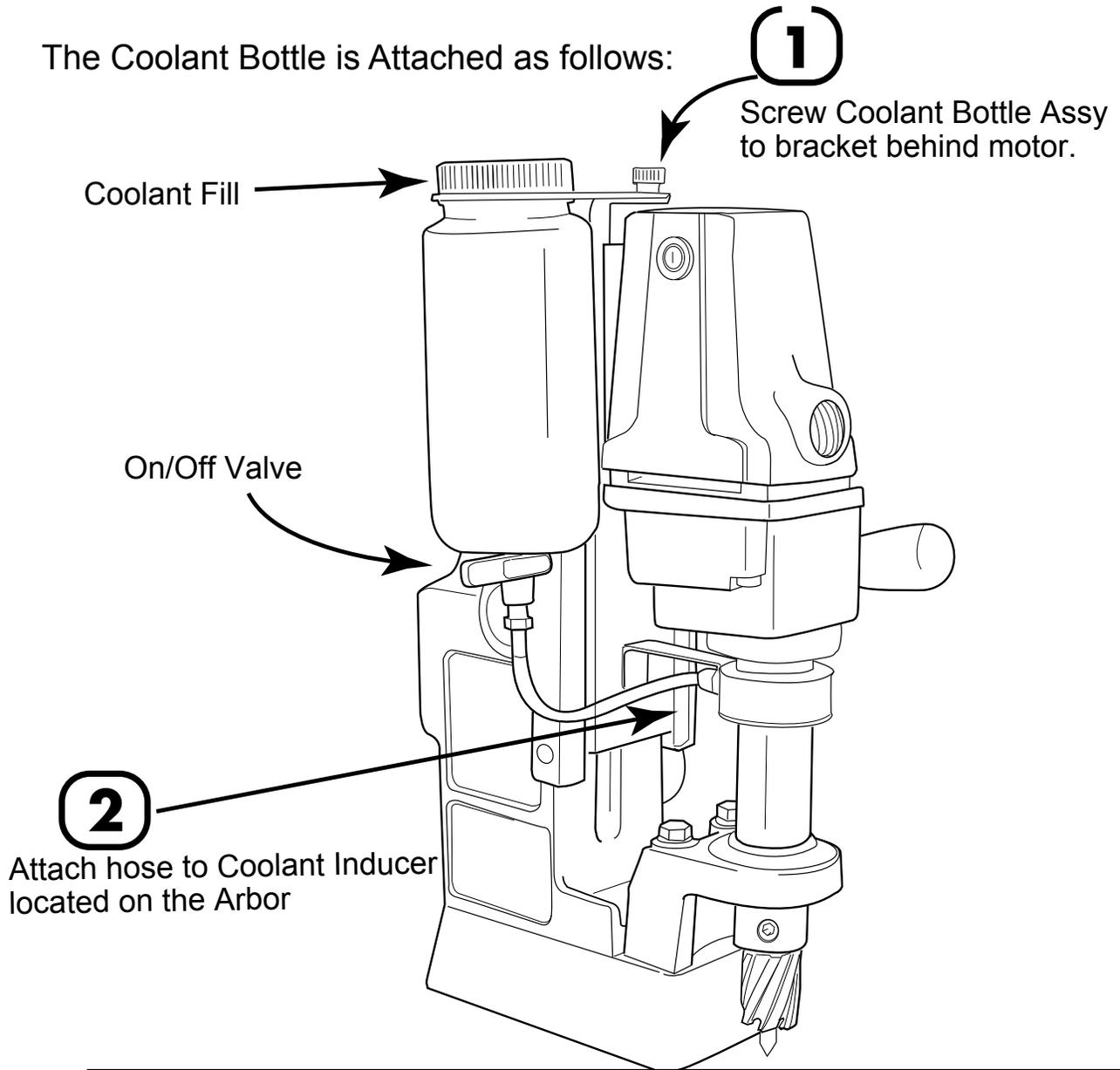


WARNING :

**CLAMP HANDLE MUST BE TIGHT PRIOR TO CUTTING HOLES -
EQUIPMENT DAMAGE OR PERSONAL INJURY COULD OCCUR**

INSTALLING COOLANT BOTTLE HMD938

The Coolant Bottle is Attached as follows:



Instructions for Use:

1. Fill Coolant Bottle with properly mixed RotaMagic™ Cutting Fluid.
2. Turn On/Off Valve to "On" position.
3. Press pilot gently down on work surface. (Coolant should slowly release from bottom of cutter.)
4. Continue with drilling operation.

HINTS FOR SMOOTHER OPERATION

1. Keep insides of Hougen Cutter clear of chips. Chips will interfere with cutting to maximum depth, may impede the free flow of lubricant and can cause cutter breakage.
2. Keep work, machine, arbor and Hougen Cutter free of chips and dirt.
3. Tighten all bolts and fasteners regularly.
4. We highly recommend using a light viscosity cutting fluid (preferably Hougen RotaMagic Cutting Fluid)
5. Occasionally check metering of cutting fluid flow. Lack of cutting fluid may cause Hougen Cutter to freeze in cut, slug to stick and may result in poor cutter life.
6. Always start cut with light feed pressure and then increase sufficiently to achieve maximum cutting rate.
7. Ease off on pressure as cutter begins to break through at the end of the cut.
8. Keep slide dovetails, brass gibs and feed rack lubricated and free of chips and dirt.
9. When slug hangs up in cutter, bring cutter down on a flat surface. This will normally straighten a cocked slug, allowing it to be ejected.
10. When cutting large diameter or deep holes it may be necessary to stop in the middle of the cut to add cutting fluid and remove the chips from around the arbor. (When doing this DO NOT raise the cutter out of the hole. Doing so can allow chips to get under the teeth of the cutter and make it difficult to restart the cut.)

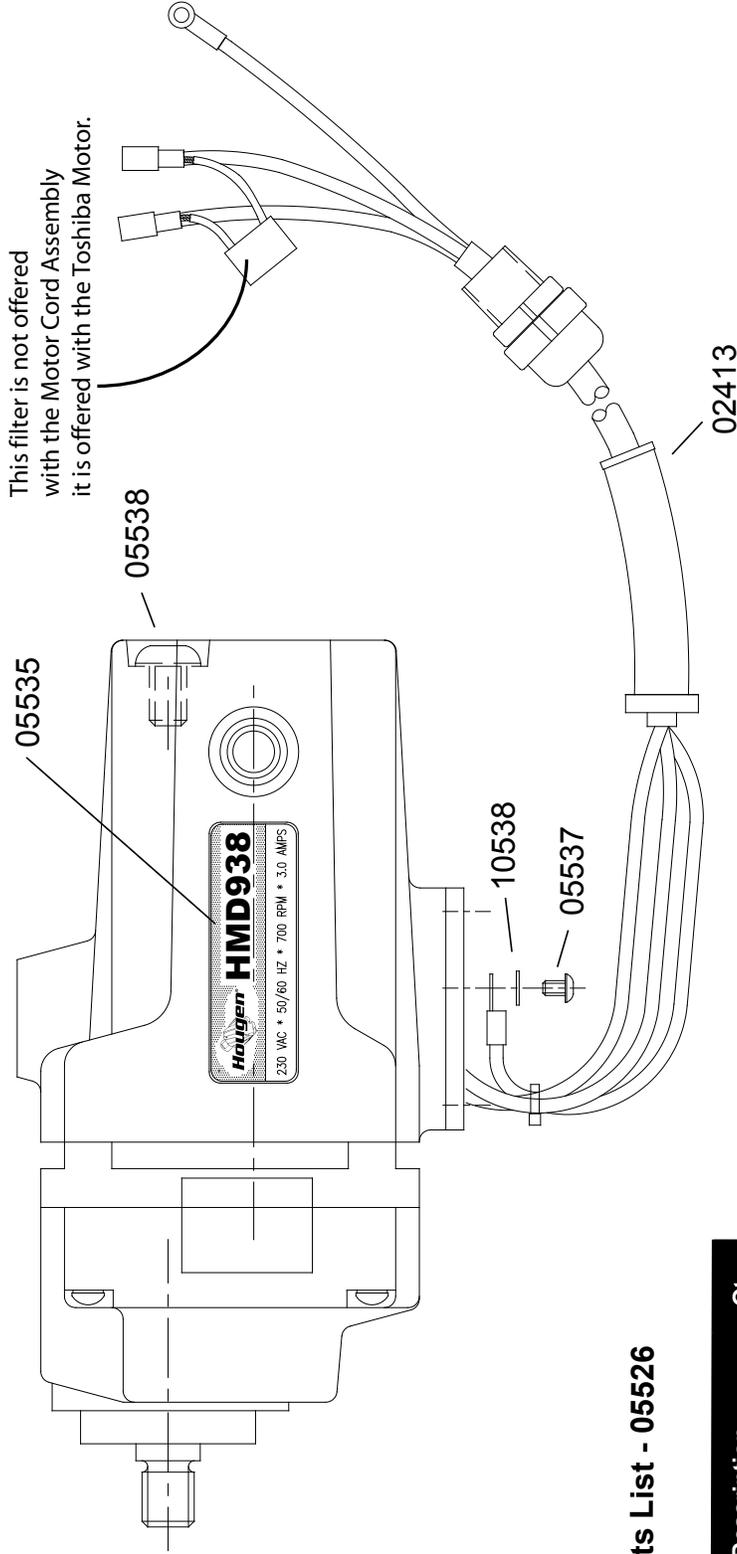
#1 cause of cutter breakage and prematurely dull teeth is too little feed pressure

REMEDIES FOR HOLEMAKING PROBLEMS

1. **Trouble: Magnetic base won't hold effectively to work.**
 - a. Cause: Chips or dirt under magnet.
Remedy: Clear area of chips and dirt.
 - b. Cause: Irregular surface on bottom of magnet or on workpiece.
Remedy: Lightly surface grind the bottom of the magnet flat and/or file imperfections flat on the work surface as needed.
2. **Trouble: Cutter tends to move across surface of work.**
 - a. Cause: Magnetic base not holding effectively.
Remedy: See causes and remedies under No. 1 above.
 - b. Cause: Too much feed pressure at start of cut.
Remedy: Light pressure until a groove is cut. The groove then serves as a stabilizer.
 - c. Cause: Worn pilot.
Remedy: Replace pilot
3. **Trouble: Out of round holes.**
 - a. Cause: Worn arbor support bracket bearing and or ejector collar.
Remedy: Replace: (only a few thousandths wear permissible.)
 - b. Cause: Misaligned support bracket
Remedy: Realign support bracket
4. **Trouble: Motor and slide won't stay in set position**
 - a. Cause: Gibs too loose
Remedy: Adjust gibs
5. **Trouble: Erratic or intermittent feed.**
 - a. Cause: Worn or pinion and/or rack.
Remedy: Replace worn parts.
6. **Trouble: Motor doesn't run when motor START button is pushed.**
 - a. Cause: Magnet is not turned on.
Remedy: Push magnet ON button.
 - b. Cause: Magnet on rough or dirty work surface and safety switch not fully depressed.
Remedy: File work surface flat and clean all chips and oil from under magnet.
 - c. Cause: No power.
Remedy: Check power source and extension cords.
 - d. Cause: Worn motor brushes.
Remedy: Replace brushes.
 - e. Cause: Faulty motor START switch.
Remedy: Return unit to an authorized repair center to have switch replaced.

NOTE: If you are unable to correct any malfunction after trying the above, do not attempt to operate the drill. Return the unit to the factory or authorized Repair Center for service.

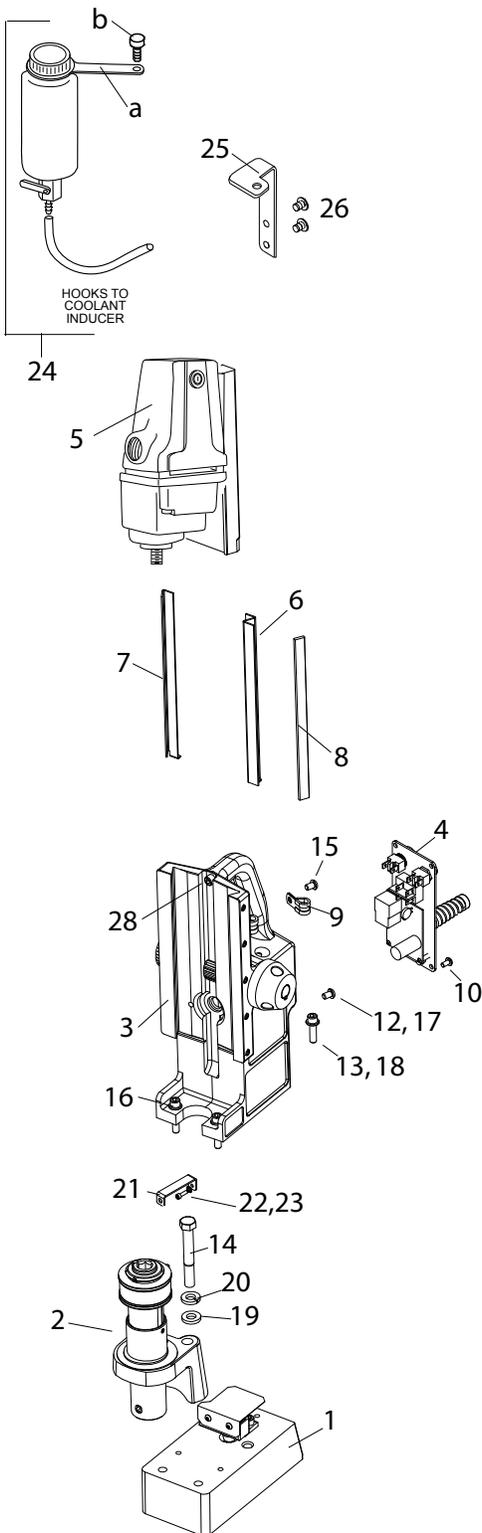
MOTOR PARTS DIAGRAM



Motor Parts List - 05526

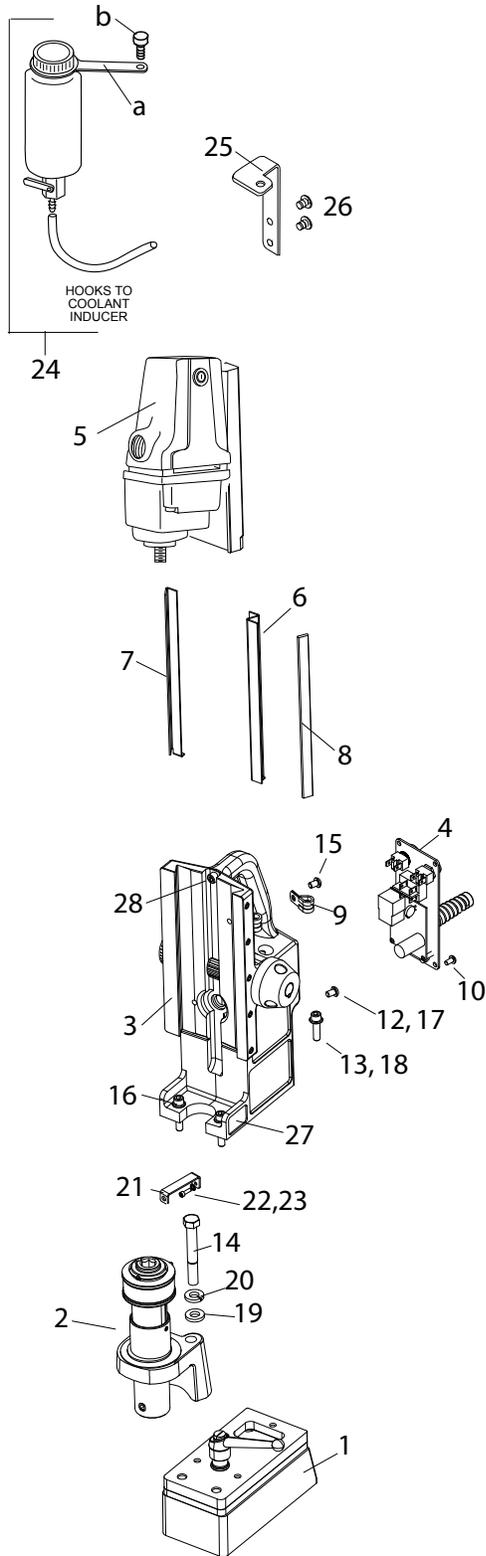
Part #	Description	Qty
02413	Motor Cord	1
05525	Motor Assembly	1
05535	Label	1
05537	Screw	1
05538	Screw	1
10538	Washer	1

0938402 HMD938 230v with Coolant



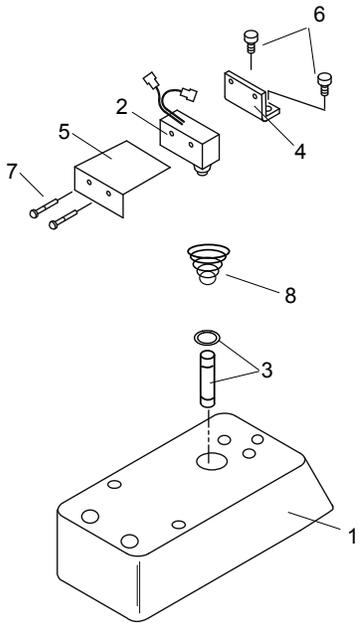
Item	Part #	Description	Qty
1	*05392	Magnet & Switch Assembly Standard Base 230v	1
2	*05531	Arbor/Front Support Assembly	1
3	*04540	Housing Assembly 230v	1
4	*05309	Panel Assembly 230v	1
5	Refer to the following pages for the Motor/Slide Assembly Breakdown		
6	02429	Brass Gib Right Hand	1
7	02430	Brass Gib Left Hand	1
8	02431	Steel Gib	1
9	02420	Cable Clamp	1
10	41044	Screw BHC #10-32 X 3/8	4
12	17002	Screw SHC #6-32 X 1/2 (ground)	1
13	40077	Screw SHC 1/4-20 X 1	1
14	02460	Hex Bolt 3/8-24 X 2-3/4	2
15	02461	Screw BHC 1/4-28 X 3/8	1
16	10553	Screw SHC 1/4-20 X 7/8	2
17	90052	Lock Washer - #6 Ext. Tooth	1
18	90028	Lock Washer	3
19	40392	Flat Washer	2
20	40391	Lock Washer	2
21	05058	Coolant Inducer Bracket	1
22	10649	Screw SHC #10-32 X 3/4	1
23	10560	Lock Washer	1
24	05060	Coolant Bottle Assembly	1
a	05059	Coolant Bottle Holder	1
b	05061	Thumb Screw	1
25	05529	Bottle Holder Bracket	1
26	04157	SCR-FHC #10-32 X 3/8	2
28	40432	SCR-SHC 1/4-28 X 3/8	1
* See Following Pages for Detailed Breakdowns			

0938404 HMD938 230v with Coolant & Swivel Base

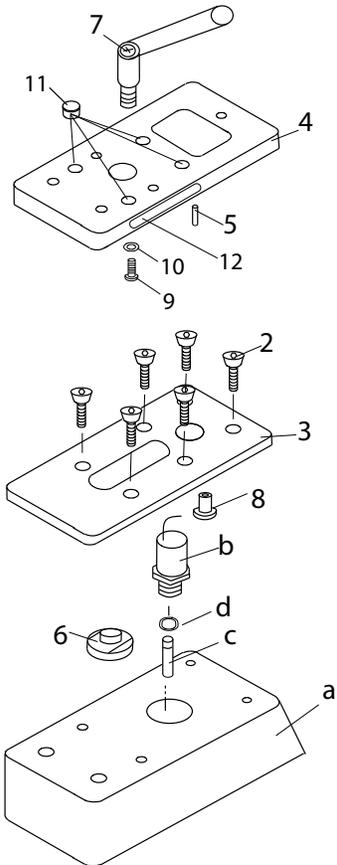


Item	Part #	Description	Qty
1	*05894	Magnet & Switch Assembly Swivel Base 230v	1
2	*05904	Arbor/Front Support Assembly	1
3	*04540	Housing Assembly 230v	1
4	*05309	Panel Assembly 230v	1
5	Refer to the following pages for the Motor/Slide Assembly Breakdown		
6	02429	Brass Gib Right Hand	1
7	02430	Brass Gib Left Hand	1
8	02431	Steel Gib	1
9	02420	Cable Clamp	1
10	41044	Screw BHC #10-32 X 3/8	4
12	17002	Screw SHC #6-32 X 1/2 (ground)	1
13	40077	Screw SHC 1/4-20 X 1	1
14	05736	Hex Bolt 3/8-24 X 2	2
15	02461	Screw BHC 1/4-28 X 3/8	1
16	10553	Screw SHC 1/4-20 X 7/8	2
17	90052	Lock Washer - #6 Ext. Tooth	1
18	90028	Lock Washer	3
19	40392	Flat Washer	2
20	40391	Lock Washer	2
21	05902	Coolant Inducer Bracket	1
22	10649	Screw SHC #10-32 X 3/4	1
23	10560	Lock Washer	1
24	05060	Coolant Bottle Assembly	1
a	05059	Coolant Bottle Holder	1
b	05061	Thumb Screw	1
25	05529	Bottle Holder Bracket	1
26	04157	SCR-FHC #10-32 X 3/8	2
27	07015	Swivel Label	1
28	40432	SCR-SHC 1/4-28 X 3/8	1
* See Following Pages for Detailed Breakdowns			

Magnet Assembly Breakdowns



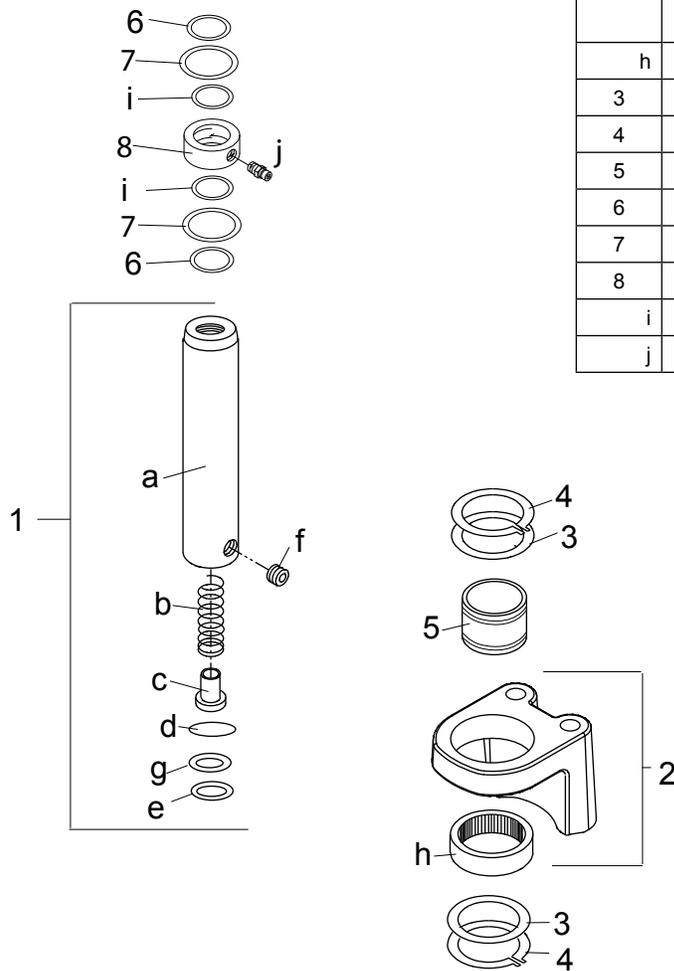
05392 Magnet Assembly 230v			
Item	Part #	Description	Qty
1	05391	Magnet Assembly 230v	1
2	04885	Safety Switch Assembly	1
3	04910	Plunger Assembly	1
4	04909	Safety Switch Bracket	1
5	10983	Micro Switch Shield	1
6	10971	Screw SHC 1/4-20 X 1/2	2
7	10972	Screw BHC #6-32 X 7/8	2
8	17271	Tapered Spring	1



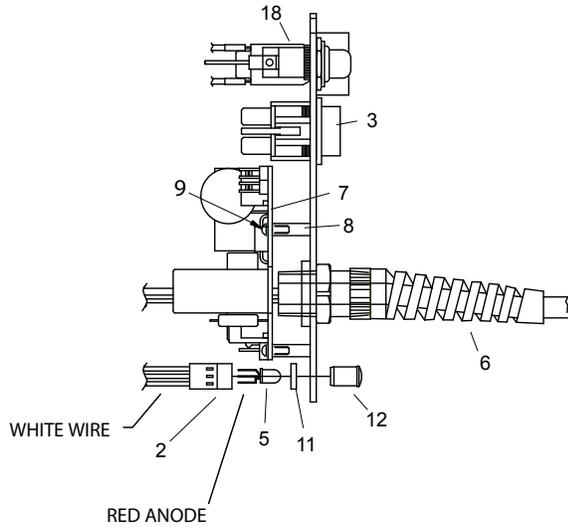
05894 Swivel Magnet Assembly 230v			
Item	Part #	Description	Qty
1	05895	Magnet/Safety Switch Assembly 230v includes a-d	
a	05896	Magnet Assembly 230v	1
b	05652	Ball Switch Assembly	1
c	05653	Plunger	1
d	05670	Retain. Ring	1
2	05743	Screw FHC 1/4-20 X 3/4	6
3	05657	Slide Housing	1
4	05656	Swivel Housing	1
5	02898	Dowel Pin 3/16 X 1/2	1
6	05658	Pivot Rod	1
7	05659	Clamp Handle Assembly	1
8	07215	Bushing Flange	1
9	41044	Screw BHC #10-32 X 3/8	1
10	90237	Flat Washer #10	1
11	07216	9/16 Hole Plug	4
12	07230	Safety Label	1

Arbor/Front Support Assembly Breakdowns

05531 Coolant Arbor Assembly (Standard Base)			
05904 Coolant Arbor Assembly (Swivel Base)			
Item	Part #	Description	Qty
1	05532	Arbor & Collar Assembly	1
a	05533	Arbor Body	1
b	05050	Spring	1
c	05054	Spring Seat	1
d	04986	Rubber Washer	1
e	10517	Retaining Ring	1
f	10506	SCR-Set 3/8-24 X .396 Flat Pt	2
g	05358	Shim Washer .50 X .75 X .028	1
2	04375	Front Support Bracket (Standard Base) includes h	1
	05734	Front Support Bracket (Swivel Base) includes h	1
h	40232	Needle Bearing	1
3	40234	Thrust Washer 40 X 60 X1	2
4	40398	Retain Ring	2
5	05055	Collar	1
6	40302	Retain Ring for 1-3/8 Shaft	2
7	40301	Thrust Washer 1-3/8 X 2-1/16 X 1/32	2
8	05063	Inducer Assembly	1
i	40300	O-ring 1-3/8 X 1-9/16 X 3/32	2
j	40303	Parker Fitting	1

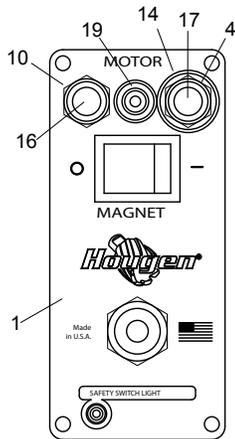


Control Panel Breakdown 230v



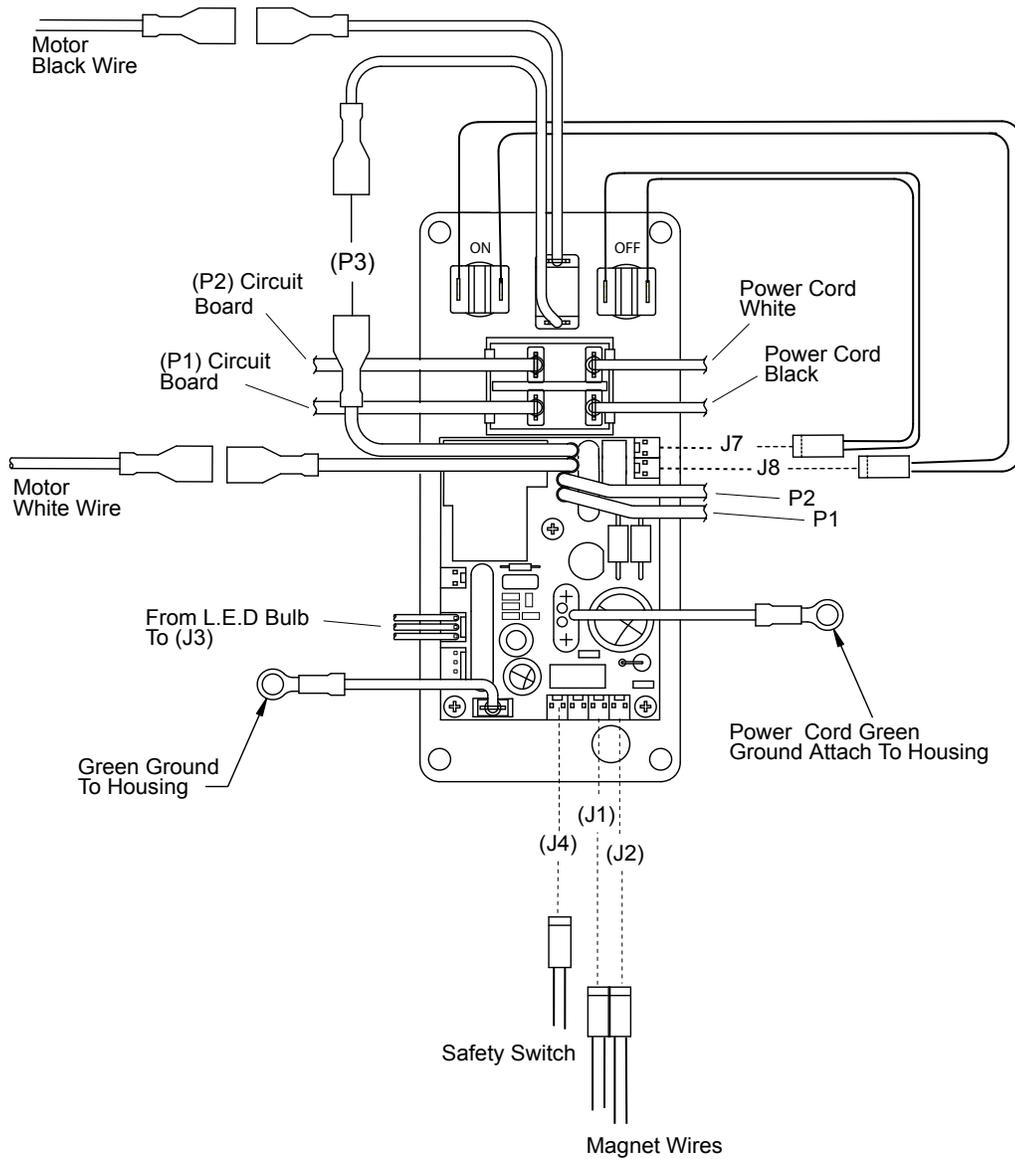
NOTE: WHEN INSERTING L.E.D. DETAIL#5 INTO HARNESS DETAIL#2 MAKE SURE FLAT ON BULB LINES UP WITH WHITE WIRE ON HARNESS.

05309 230v Panel for Singapore			
Item	Part #	Description	Qty.
1	05929	Faceplate	1
2	04877	Wire Harness	1
3	04664	Magnet Switch	1
4	01334	Motor ON Switch	1
5	04881	Bulb L.E.D	1
6	05076	Power Cord (230v) for the 05309	1
7	05827	Circuit Board (230v)	1
8	02548	Stand-Off 3/16 x 9/16 LG	3
9	02547	#4-40X5/16 Phillips Head Screw	3
10	01335	Motor OFF Switch	1
11	04878	Spacer	1
12	04879	Clear Lens	1
13	*90690	Cable Tie	1
14	01226	Switch Guard	1
15	*05205	Wire Harness (board to housing)	1
16	01228	Red Switch Cover	1
17	02409	Green Switch Cover	1
18	05926	Circuit Breaker	1
19	05928	Rubber Boot Seal	1
		*not shown	



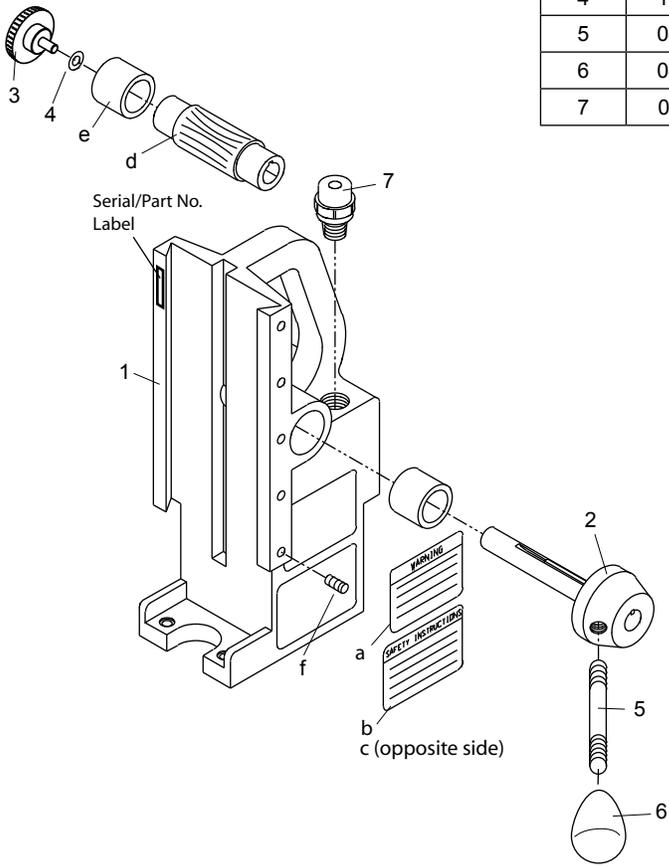
The **05309** is assembled without an electrical plug at the end of the power cord.

Control Panel Wiring 230v



Housing Assembly Breakdown

04540 Housing Assembly			
Item	Part #	Description	Qty
1	04541	Housing Assembly for 04540 assy. (includes a-f)	1
a	04530	Warning Label for 04540 assy.	2
b	04529	Safety Label (shown)	1
c	04553	Safety Chain Label for 04540 assy	1
d	40229	Feed Gear	1
e	40231	Bronze Bushing	2
f	40237	Gib Screws	5
2	40254	Hub Assembly	1
3	05839	Comfort Grip Knob	1
4	10679	Flat Washer	1
5	04558	Feed Handle	3
6	04532	Feed Handle Knob	3
7	02411	Strain Relief	1



Motor Slide Assembly Breakdown

Motor & Slide Assemblies 230v			
Item	Part #	Description	Qty
1	05525	Motor Assembly 230v	1
a	05535	Motor Label	1
b	02413	Motor Cord	1
c	05537	SCR-BHC M4 X .7 X 6mm	1
d	10538	Lock Washer #8 ext. Tooth	1
e	05538	SCR-BHC M10 X 1.5 X 16mm	1
f	90690	Cable Tie	1
g	90218	Female Terminal	2
2	05528	Dove Tail Slide (Standard Base)	1
	05899	Dove Tail Slide (Swivel Base)	1
3	02428	Rack Gear (Standard Base)	1
	05825	Rack Gear (Swivel Base)	1
4	05534	SCR-SHC M5 X .8 X 25mm	4
5	04721	Washer - Split Lock 1/4"	4
6	40038	SCR-SHC #10-32 X 5/8	3
7	10560	Washer - #10 EXT. Tooth Lock	3
8	05530	Spacer	1

