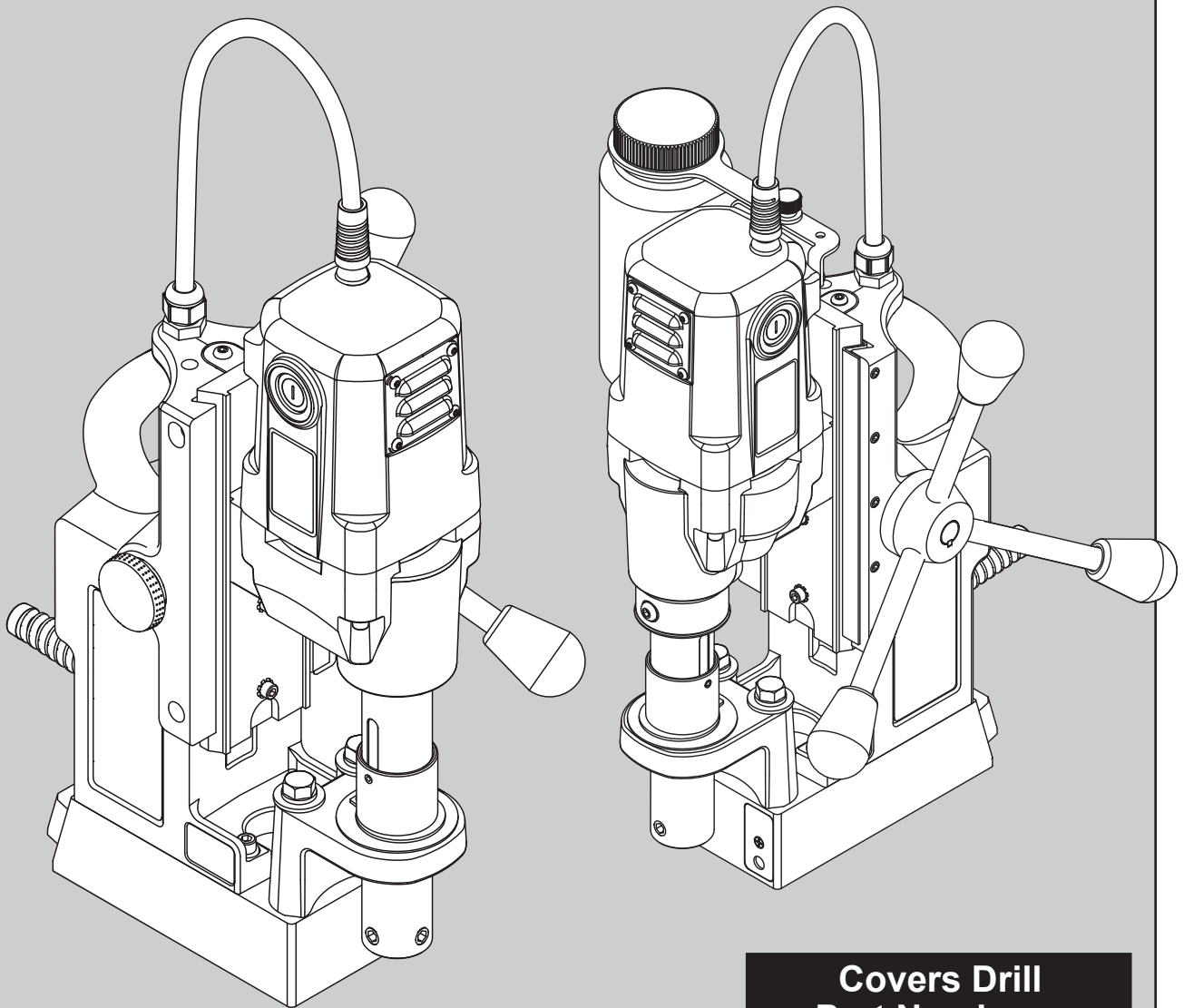




OPERATOR'S MANUAL

HMD904 SERIES PORTABLE MAGNETIC DRILL



**Covers Drill
Part Numbers:**

0904101

0904102

HOUGEN® PORTABLE MAGNETIC DRILL MODEL HMD904 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.

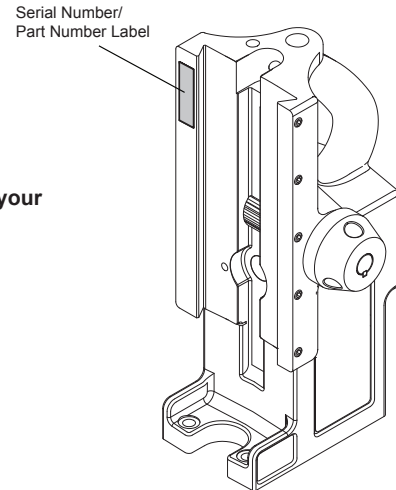
Specifications

Cutter Type.....Hougen "12,000-Series" and Copperhead™ Carbide
 Hole Capacity.....7/16" to 1-1/2" (12mm-38mm)
 Depth of Cut.....2" (50mm)
 Motor.....115V - 8A, 920W, 450 RPM
 Net Weight.....28.9 lbs. (13.1kg)

The HMD904 is offered in many versions. Refer to the Serial/Part number Label on your housing to direct you to the correct breakdown.

Part Numbers

0904101 HMD904 115V
0904102 HMD904 115V with Coolant Bottle



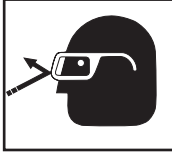
UNPACKING YOUR NEW MAGNETIC DRILL

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
 - 24166** 7/32" 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 into the three Feed Handles and then screw Handles into the Hub Assembly. Do not over tighten or may strip the knobs.
 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! Cutters are sharp. Wear gloves when installing or removing cutter from arbor. Do not grab a rotating cutter.



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

IMPORTANT SAFETY INSTRUCTIONS



WARNING:

Read and understand all instructions. Failure to follow all instructions listed below, may result in electrical shock, fire and/or serious personal injury.

Work Area

Keep your work area clean and well lit. Cluttered benches and 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 bystanders, children, and visitors away while operating a power tool. Distractions can cause you to lose control.

Avoid accidental starting. Be sure switch is off before plugging in. Carrying tools with your finger on the switch or plugging in tools that have the switch on invites accidents.

Remove adjusting keys or switches before turning the tool on. A wrench or a key that is left attached to a rotating part of the tool may result in personal injury.

Do not overreach. Keep proper footing and balance at all times. Proper footing and balance enables better control of the tool in unexpected situations.

Electrical Safety

Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the ground prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. If the tools should electrically malfunction or breakdown, grounding provides a low resistance path to carry electricity away from the user.

Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators. There is an increase risk of electric shock if your body is grounded.

Don't expose power tools to rain or wet conditions. Water entering a power tool will increase the risk of electric shock.

Do not abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately. Damaged cords increase the risk of electric shock.

When operating a power tool outside, use an outdoor extension cord marked "W-A" or "W"; These cords are rated for outdoor use and reduce the risk of electrical shock.

Use safety equipment. Always wear eye protection. Dust mask, no-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

Always use safety chain. Mounting can release.

Tool Use and Care

Use clamps or other practical ways to secure and support the work piece to a stable platform. Holding the work by hand or against your body is unstable and may lead to loss of control.

Do not force the tool. Use the correct tool for your application. The correct tool will do the job better and safer at the rate for which it is designed.

Do not use tool if switch does not turn it on or off. Any tool that cannot be controlled with the switch is dangerous and must be repaired.

Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool. Such preventative safety measures reduce the risk of starting the tool accidentally.

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

Maintain tools with care. Keep cutting tools sharp and clean. Properly maintained tools, with sharp cutting edges are less likely to bind and are easier to control.

Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tools operation. If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.

Personal Safety

Stay alert, watch what you are doing and use common sense when using a power tool. Do not use tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating power tools may result in serious personal injury.

Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts. Loose clothes, jewelry, or long hair can be caught in moving parts.

IMPORTANT SAFETY INSTRUCTIONS

Use only accessories that are recommended by the manufacturer for your model. Accessories that may be suitable for one tool, may become hazardous when used on another tool.

Service

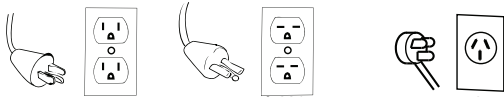
Tool service must be performed only by qualified repair personnel. Service or maintenance performed by unqualified personnel could result in a risk of injury.

When servicing a tool, use only identical replacement parts. Follow instructions in the Maintenance Section of this manual. Use of unauthorized parts or failure to follow Maintenance Instructions may create a risk of electric shock or injury.

Safe Electrical Connection

Your Mag Drill is rated for use on 115VAC or 230V at 50-60Hz. Do not attempt to use drill on power sources rated other than this.

Plugs and Receptacles



Typical USA 115V Typical USA 230V 230V Type I Plug

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.



Extension Cords

Use only 3-wire extension cords that have a 3-prong grounding type plug 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.

LENGTH OF CORD, FEET	RECOMMENDED WIRE GAUGE	RECOMMENDED WIRE GAUGE
	115V MOTOR 10 - 12 AMPS	230V 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

Outdoor Extension Cord Use

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

Additional Safety Precautions

Arbor and cutter should never be used as a handheld. Keep hands and clothing away from all moving parts. Do not use Houghn 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.

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.

Circuit Breaker (If Applicable)

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

Circuit Breaker Operation (If Applicable)

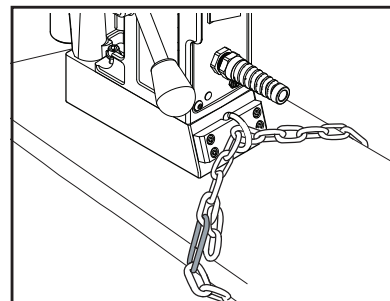
The circuit breaker is a thermal breaker. When it reaches the higher temperature rating it will trip and cause the unit to shut down. This is a protective device and can be reset after 5 to 10 minutes. To reset the breaker, press the breaker button back in. If it does not reset, let the unit cool a little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

Save these instructions.

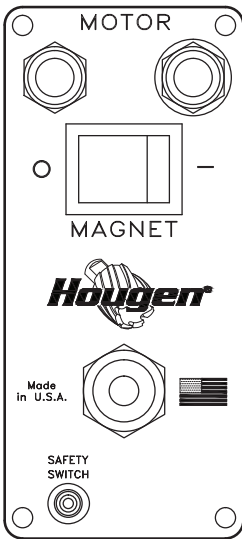
SAFETY CHAIN INSTRUCTIONS

A safety chain should **ALWAYS** be used whenever operating the drill.

The safety chain prevents the drill unit from falling, in the event of a power failure or if the magnet breaks loose from the work surface. The safety chain attaches to the drill by running the chain thru the D-Ring on the back of the unit and then continuing around the material and/or work surface. Adjust the chain so it is tight and secure. Please refer to the diagram.



OPERATION OF CONTROLS BEFORE INSTALLING HOUGEN CUTTER



CONTROL PANEL SWITCH PLATE

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.**

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 SWITCH — 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 SWITCHES — Starts and stops the motor

1. Place Magnetic Drill on clean, flat steel plate that is at least 3/8" 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.
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.**

SAFETY SWITCH INDICATOR LIGHT

**** SAFETY SWITCH LIGHT WILL COME ON AND REMAIN ON WHILE DRILL IS PLUGGED IN ****

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

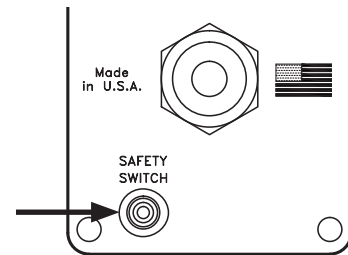
If light is Green:

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.



CONTROL PANEL SWITCH PLATE

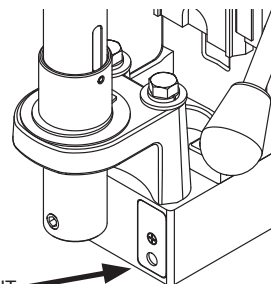
Material must be a least 3/8" thick. Material thinner than 3/8" will cause a "weak" magnet condition. HOUGEN MANUFACTURING RECOMMENDS THAT CONDITIONS ARE CORRECTED SO LIGHT IS GREEN. THIS ALLOWS FOR THE UNIT TO BE OPERATED IN A SAFE MANNER.

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

PILOT LIGHT SWITCH

The Pilot Light is a Standard Feature on Hougen portable magnetic drills. Its purpose is to illuminate the work surface area for easier viewing of pilot.

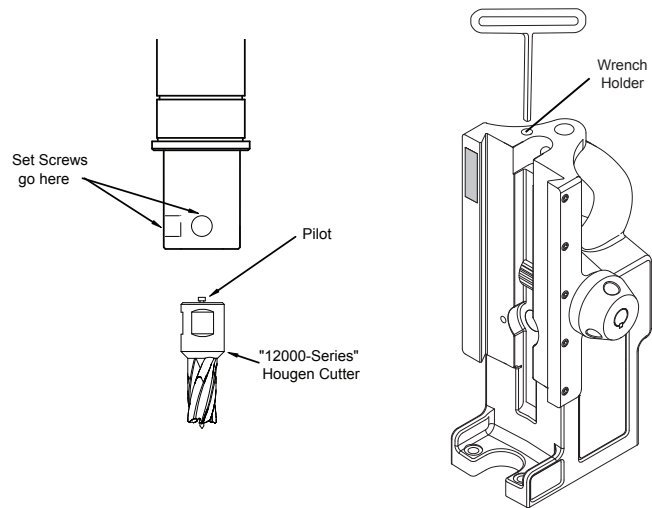
(The HMD904 has an "Always On" Feature)



PILOT LIGHT

INSTALLING HOUGEN CUTTER IN ARBOR

1. Disconnect from power source and remove T-Handle wrench from holder at top of drill.
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 screws.
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.



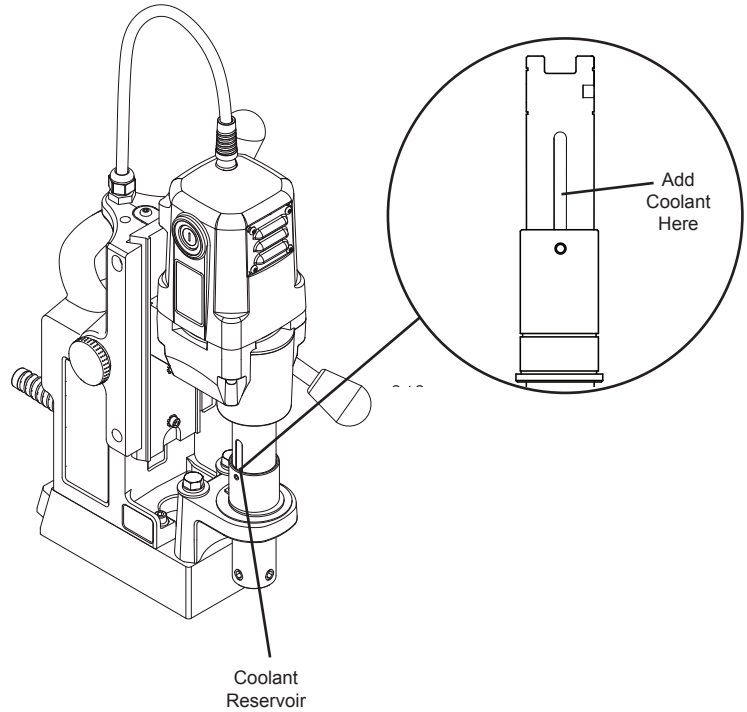
OPERATING INSTRUCTIONS

Always remember that the magnet's holding power is directly related to the workpiece thickness and surface condition. 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 (3/8" or less) or material with uneven surfaces.

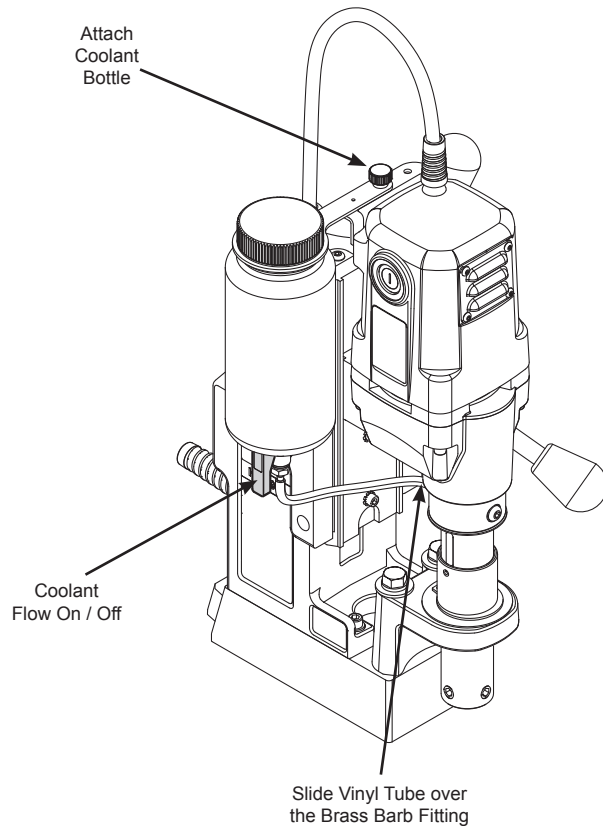
1. Make sure workpiece and bottom of magnet are free of chips, oil, etc.
2. Position drill by sliding it and gently feeding Arbor so that pilot point is touching center of hole to be drilled.
3. **Secure unit to workpiece with safety chain.**
4. Turn magnet "ON" by pressing the magnet ON switch.
5. Turn Feed Handle, raising the cutter until the pilot is above the work surface.
6. Fill coolant reservoir or fill attached coolant bottle if applicable.
7. Make certain that cutter is clear of workpiece and turn motor "ON" by pressing the motor START switch.
8. Feed Hougen Cutter slowly into workpiece. Only after cutting path is established to a depth of about 1/16" can full force be applied to feed handles.
9. Ease up on feed pressure as cutter starts breaking through.
10. 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.
11. Turn magnet "OFF" by pressing the magnet OFF switch.
12. **Disconnect from power source.**
13. 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.

OPERATION OF CUTTING FLUID RESERVOIR

1. With Magnetic Drill in operating position, turn the feed handles so that cutter and pilot are above the work surface.
2. With magnet turned ON & motor OFF, fill reservoir by introducing cutting fluid through slots in Arbor. **Cutting fluid should not leak out.**
3. Test metering capabilities of Arbor/Cutter/Pilot assembly (magnet ON - motor OFF) feeding the Arbor gently toward work surface until pilot is pushed up into Cutter, thus allowing fluid to filter down onto work surface through groove in pilot.
4. For proper lubrication, all fluid in reservoir should empty onto work surface in no less than 15 seconds and no longer than 30 seconds.
5. Reservoir holds enough coolant for cutting approximately one hole.
 - * This method of using coolant can also be used for an attached coolant bottle if the bottle is lost.
6. For horizontal or drilling overhead holes, use Slick-Stik Lubricant.



COOLANT BOTTLE ASSEMBLY

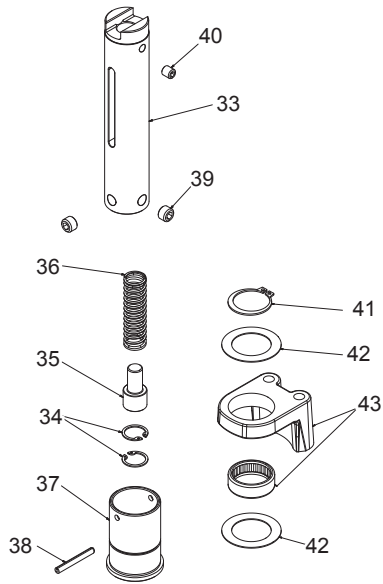


05060 Coolant Bottle Assembly

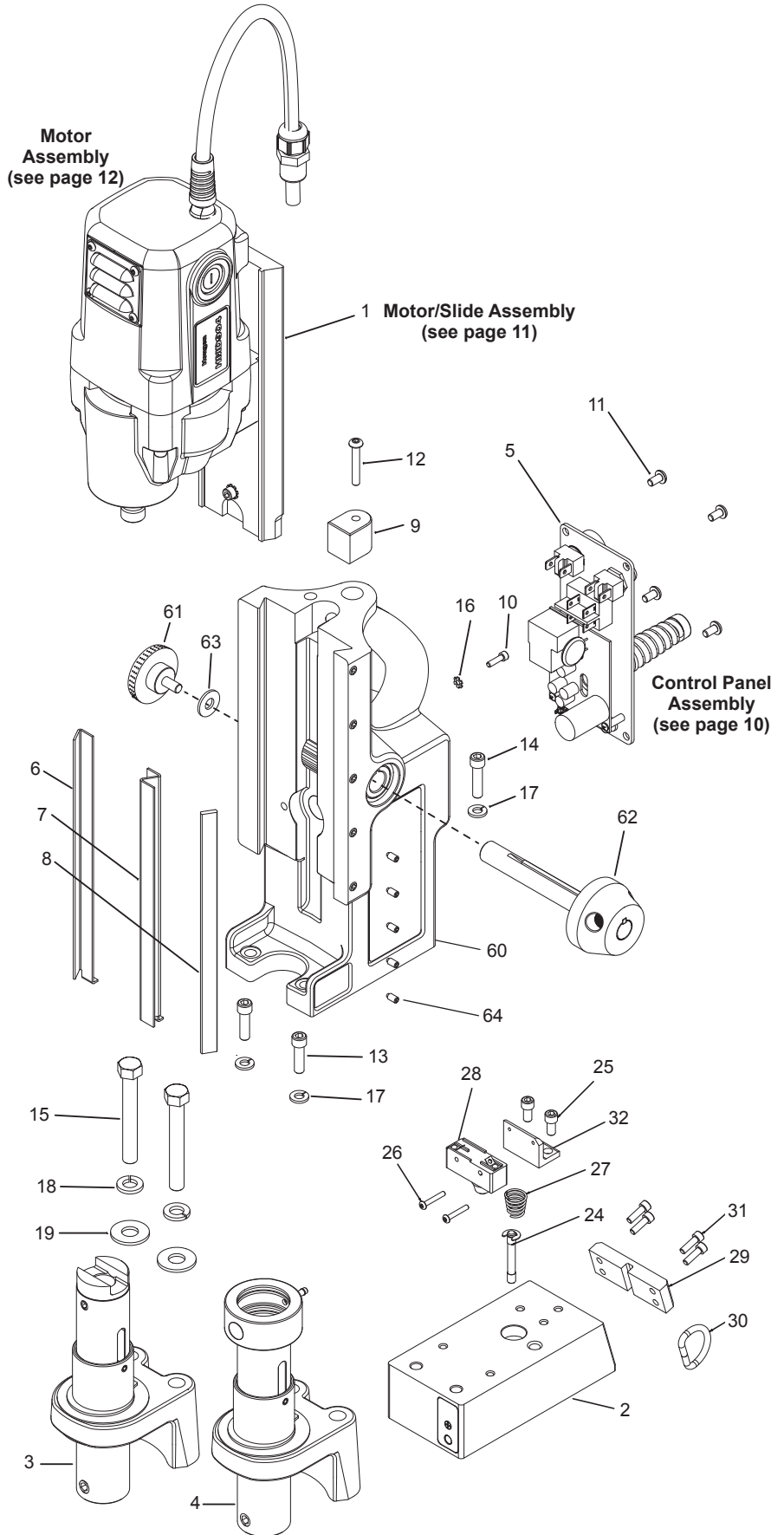
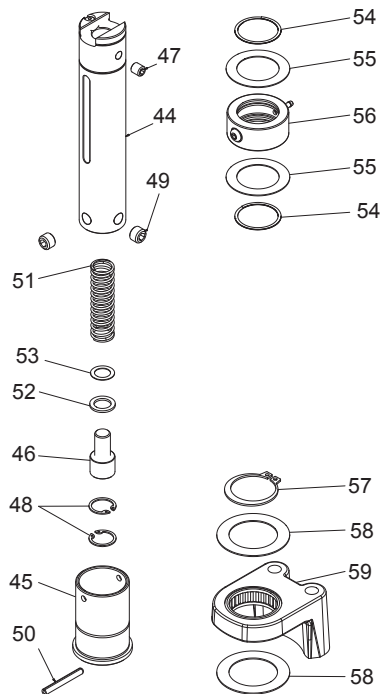
Part #	Description
05064	Round Bottle
05059	Coolant Bottle Bracket (Bottle to Bracket)
05061	Thumb Screw (holds bottle bracket to mounting bracket)
05065	Ball Valve
05067	Brass Barb Fitting (bottom of the bottle)
40304	Vinyl Tube
07080	Brass Fitting (vinyl tube to coolant inducer) not included in 05060 kit.

HMD904 115V MAG BASE DRILL

#3 - Arbor Assembly



#4 - Coolant Arbor Assembly



0904101 and 0904102 Breakdowns			
Item	Part #	Description	Qty
1	07940	Motor / Slide Assy.	1
3	07941	Non-Coolant Arbor Assy.	1
4	07831	Coolant Arbor Assy.	1
5	07889	Control Panel	1
6	02429	Gib, Brass, Right Hand	1
7	02430	Gib, Brass, Left Hand	1
8	02431	Gib Steel	1
9	07833	Stop Block	1
10	17002	SCR SHC #6-32 x 1/2 LG	1
11	41044	SCR BHC #10-32 x 3/8 LG	4
12	10559	SCR BHC #10-32 x 1-1/4 LG	1
13	10553	SCR SHC 1/4-20 x 7/8 LG	2
14	40077	SCR SHC 1/4-20 x 1" LG	1
15	02460	Hex Bolt 3/8-24 x 2-3/4 LG	2
16	90052	Lock Washer Ext. #6	1
17	90028	Lock Washer Helical 1/4	3
18	40391	Lock Washer Helical 3/8	2
19	40392	Washer Flat 3/8 Type A	2
Accessories Included			
	10565	Hex Key 1/8 wrench	1
	90724	Safety Chain 3/16 X 5' w/Snap Hook	1
	08074	Carrying Case w/Label	1
	24166	7/32" Hex Key for Arbor	1

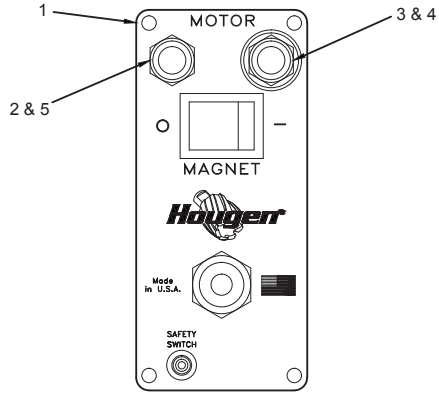
07882 Magnet Assembly 115V			
Item	Part #	Description	Qty
2	07861	Magnet Assembly	1
24	04910	Plunger Assembly	1
25	10971	SCR SHC 1/4-20 x 1/2" LG	2
26	10972	SCR BHC #6-32 x 7/8" LG	2
27	17271	Spring - Taper, Comp.	1
28	04885	Microwitch Assy.	1
29	07887	Plate - Ring Retaining	1
30	24144	D-Ring	1
31	41046	SCR SHC #10-32 x 1/2" LG	4
32	04909	Bracket - Safety Switch	1

07941 Arbor & Front Support Bracket Assy.			
Item	Part #	Description	Qty
33	07943	Arbor - Non Coolant	1
34	10517	Ring - Retaining Internal	2
35	07079	Spring Seat	1
36	05049	Spring - Comp	1
37	07162	Collar, Ejector	1
38	40312	Pin-Roll 3/16 dia x 1.564 Altered	1
39	40222	SCR Set 7/16-14 x .305	2
40	40256	SCR Set 5/16-18 x 3/8 Oval Pt	1
41	40398	Ring - Retaining	1
42	40234	Washer, Thrust	2
43	07870	Front Support Bracket Assy.	1

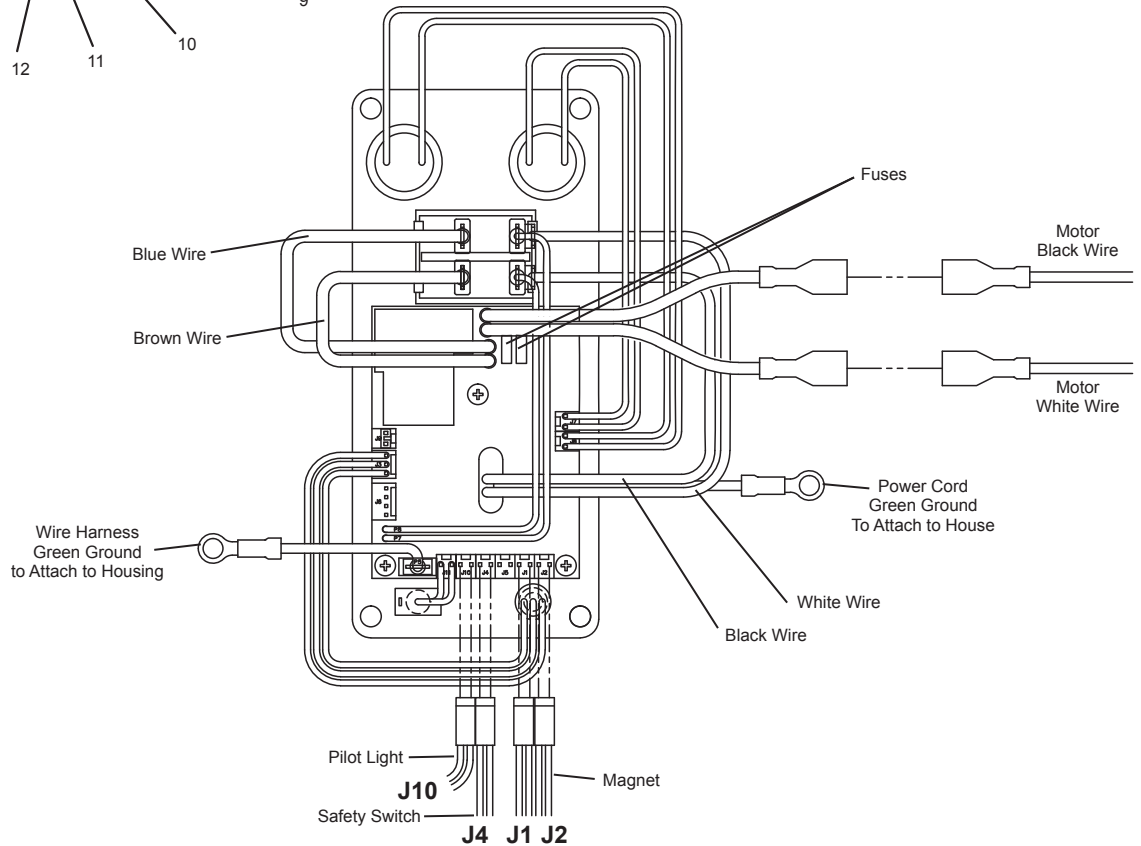
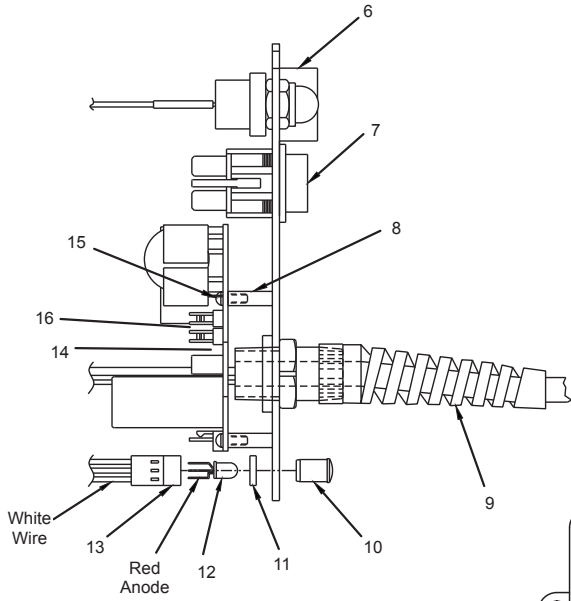
07831 Coolant Arbor Assembly			
Item	Part #	Description	Qty
44	07872	Arbor - Coolant	1
45	07162	Collar Ejector	1
46	07079	Spring Seat	1
47	40256	SCR Set 5/16-18 x 3/8 Oval Pt	1
48	10517	Ring - Retaining Internal	2
49	40222	SCR Set 7/16-14 x .305	2
50	40312	Pin-Roll 3/16 dia x 1.564 Altered	1
51	05049	Spring - Comp	1
52	07436	Washer - Rubber	1
53	07440	Washer - Shim 12 x 18 x .5mm	1
54	40302	Ring - Retaining	2
55	40301	Washer, Thrust 1-3/8 x 2-1/16 x 1/32	2
56	07445	Coolant Inducer	1
	40300	O-Ring (<i>not shown</i>)	1
	07080	Hose Fitting (<i>not shown</i>)	1
	07082	SCR BHC 1/4-28 x 1/4 (<i>not shown</i>)	1
57	40398	Ring - Retaining	1
58	40234	Washer, Thrust	2
59	07870	Front Support Bracket Assy.	1

07832 Housing Assembly			
Item	Part #	Description	Qty
60	07877	Drill Housing Assembly	1
61	05839	Knob - Comfort Rubber Grip	1
62	40254	Hub Assembly	1
63	10679	Washer - Flat 1/4 Type A	1
64	40237	Gib Screws	5

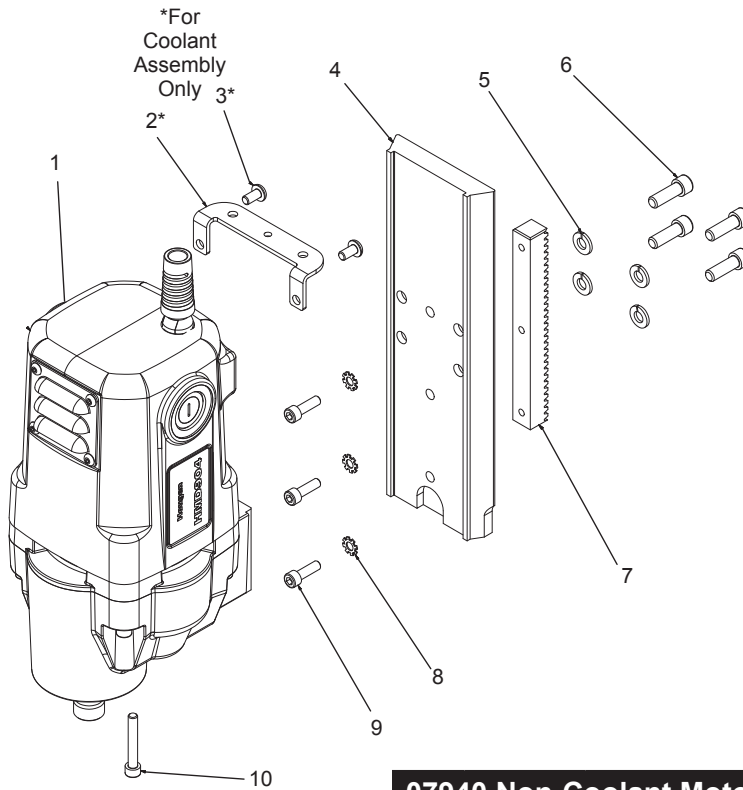
CONTROL PANEL BREAKDOWN & WIRING 115V



08251 115V Panel Assembly			
Item	Part #	Description	Qty
1	07011	Faceplate	1
2	01335	Switch - Motor Off	1
3	01334	Switch - Motor On	1
4	02409	Seal - Green	1
5	01228	Seal - Red	1
6	01226	Guard Switch	1
7	04614	Magnet Switch	1
8	02548	Stand Off	3
9	24073	Power Cord Assembly	1
10	04879	Lens Clear L.E.D.	1
11	04878	Spacer L.E.D.	1
12	04881	Bulb L.E.D.	1
13	04877	Wire Harness L.E.D.	1
14	07947	Circuit Board - 115V	1
15	02547	SCR #4-40 x 5/16 LG	3
16	07522	Fuse	2



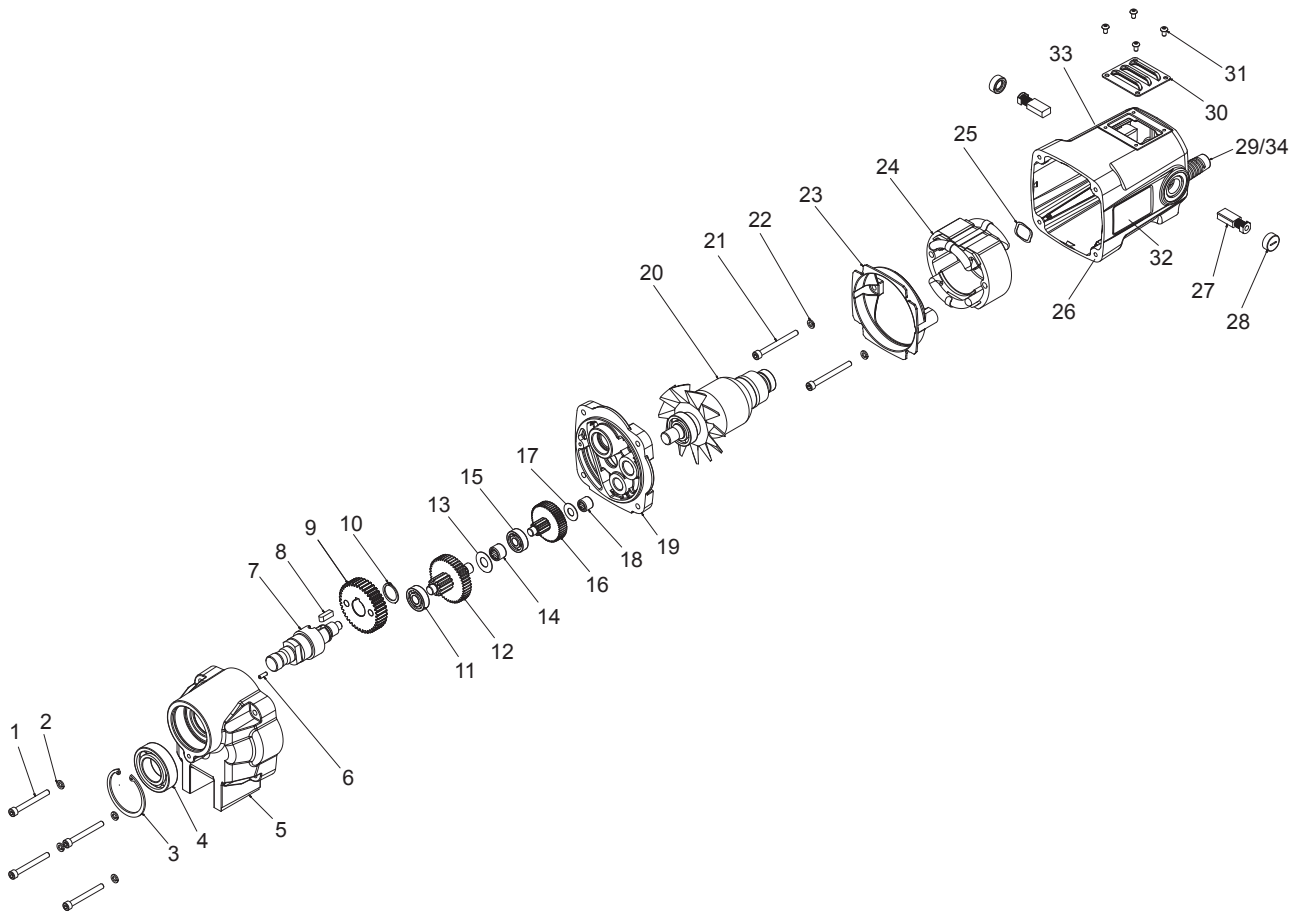
MOTOR SLIDE ASSEMBLY BREAKDOWN



07940 Non-Coolant Motor & Slide Assembly 07830 Coolant Motor & Slide Assembly

Item	Part #	Description	Qty
1	07835	Motor Complete Assembly	1
2	07837	Bracket (for Coolant Assy Only)	1
3	41044	SCR BHC #10-32 x 3/8 LG (for Coolant Assy Only)	2
4	07836	Dovetail Slide	1
5	90028	Lock Washer Helical 1/4	4
6	10624	SCR-SHC 1/4-20 x 3/4	4
7	08001	Rack Gear	1
8	10560	Lock Washer Ext. #10	3
9	40038	SCR SHC #10-32 x 5/8 LG	3
10	51044	SCR SHC #10-32 x 1-1/4 LG	1

MOTOR PARTS DIAGRAM 115V



07835 Motor Assembly

Item	Part #	Description	Qty	Item	Part #	Description	Qty
1	08234	SCR SHC #10-32 X 1-58 LG	4	18	17659	Needle Bearing	1
2	50038	Washer - Lock Helical #10	4	19	07857	Gear Box Cover	1
3	07860	Retaining Ring	1	20	17630	Armature	1
4	40274	Bearing 25mm x 47mm x 12mm	1	21	07849	SCR SHC #10-32 x 2 LG	2
5	08004	Gear Box Housing	1	22	50038	Washer - Lock Helical #10	2
6	01169	Pin - Dowel 1/8 x 3/8	1	23	07846	Baffle	1
7	07859	Spindle - Motor Drive	1	24	08267	Field	1
8	17611	Key	1	25	08000	Washer - Spring	1
9	17609	Spur Gear #6	1	26	07843	Motor / Brush Holder	1
10	17626	Retainer Ring	1	27	17621	Carbon Brush	2
11	17603	Bearing 24mm x 9mm x 7mm	1	28	17622	Cap Brush Holder	2
12	17608	Spur Gear Assy	1	29	40445	Strain Relief	1
13	17613	Washer, Flat 10mm	1	30	07848	Cover - Brush Access	1
14	17660	Needle Bearing	1	31	02385	SCR BHC #6-32 x 1/4	4
15	17602	Bearing 22mm x 8mm x 7mm	2	32	07840	Motor Label	1
16	17607	Spur Gear Assembly	1	33	07841	Specs Label	1
17	17610	Washer - Flat 8mm	1	34	07844	Motor Cord (Not Shown)	1

MAINTENANCE

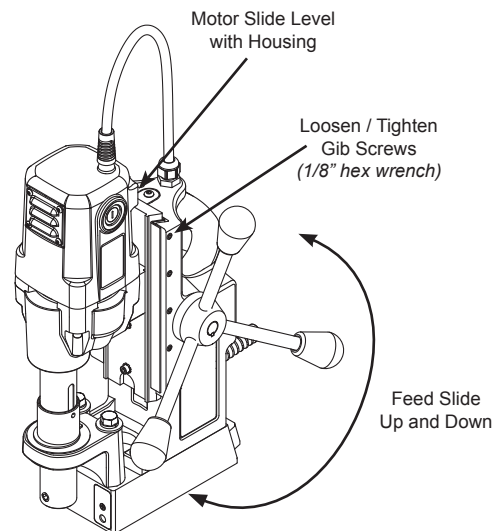
In order to minimize wear on moving parts and to insure smoother operation and longer life for your magnetic drill, the following maintenance should be done periodically, based on use.

1. Regularly tighten all fasteners and replace all worn parts.
2. Check motor brushes and replace if worn.
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 (see *arbor removal on page 14*) and pack the bearing in the front support bracket with grease. Use Shell Cyprina-RA or equivalent.

ADJUSTMENT OF GIBS

1. Check gibs regularly to make certain they are tight. Tighten as required.
2. Loosen all Gib Screws.
3. 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.
4. Feed the drill in and out again.
5. Adjust Gib Screws so that there is uniform pressure from top to bottom. (Top of motor slide flush with top of housing.)
6. Turn each Gib Screw in about 1/8 to 1/4 turn, depending upon your preference.
7. Gibs should be tight enough so that slide moves up and down smoothly with no wobble or shaking. (Looseness will cause cutter breakage.)

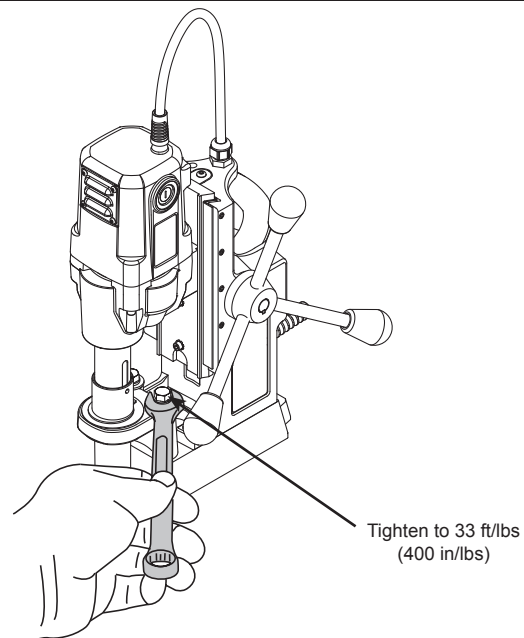
NOTE: Gibs should be lubricated regularly.



ARBOR ADJUSTMENT

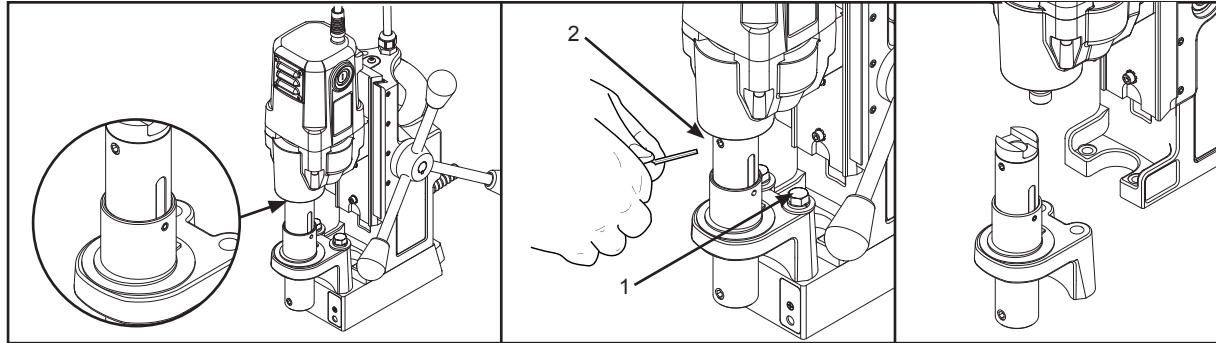
Adjust Gibs before adjusting front support bracket.

1. Arbor support bracket may become loose over time. Check Arbor Support bolts regularly to make certain they are tight. Tighten as required.
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.



ARBOR & FRONT SUPPORT BRACKET REMOVAL AND INSTALLATION

Non-Coolant Arbors



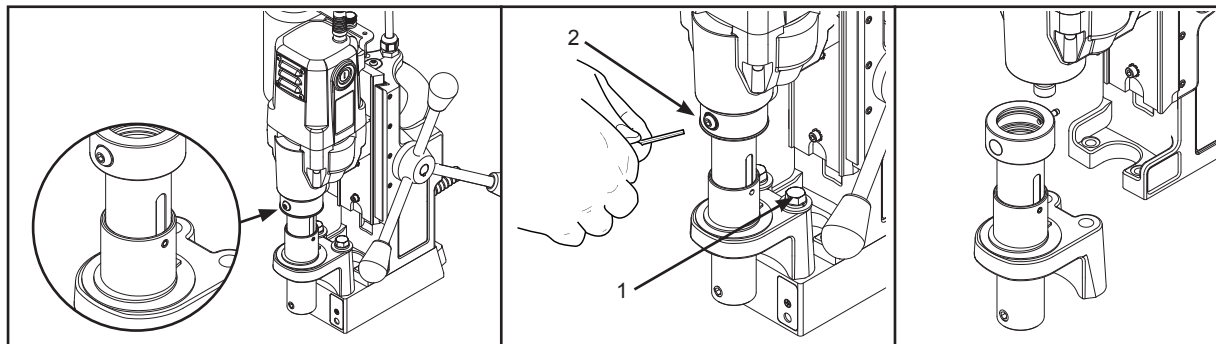
Removal (Non-Coolant)

1. Loosen arbor support bracket bolts.
2. Loosen set screw holding arbor onto motor output shaft.
3. Remove arbor.

Installation (Non-Coolant)

1. Hand tighten front support bracket bolts. Do not tighten all the way.
2. Slide arbor to full up position and hold arbor in position over the motor output shaft.
3. Tighten set screw to hold arbor onto motor output shaft.
4. Turn feed handle until motor and arbor are at the bottom of their travel.
5. Tighten front support bracket bolts to 400 in/lbs.
6. Run motor for 10 seconds. (If visual movement of arbor is noticed, restart at step 1)
7. Re-check for tightness of arbor set screw.

Coolant Arbors



Removal (With Coolant)

1. Loosen arbor support bracket bolts.
2. Remove screw in coolant inducer. Rotate arbor until arbor screw is in line with hole.
3. Loosen set screw holding arbor onto motor output shaft.
4. Remove arbor.

Installation (With Coolant)

1. Hand tighten front support bracket bolts. Do not tighten all the way.
2. Slide arbor to full up position and hold arbor in position over slot drive motor output shaft.
3. Tighten set screw to hold arbor onto motor output shaft.
4. Replace coolant inducer screw.
5. Turn feed handle until motor and arbor are at the bottom of their travel.
6. Tighten front support bracket bolts to 400 in/lbs.
7. Run motor for 10 seconds. (If visual movement of arbor is noticed, restart at step 1)
8. Re-check for tightness of arbor set screw.

HINTS FOR SMOOTHER OPERATION

1. Keep the inside of Hougén Cutter clear of chips. Chips will interfere with cutting to maximum depth, maybe impede the free oil flow and can cause cutter breakage.
2. Keep work, machine, arbor and Hougén Cutter free of chips and dirt.
3. Tighten all bolts and fasteners regularly.
4. We highly recommend using a light viscosity cutting fluid (preferably Hougén Cutting Fluid).
5. Occasionally check metering of cutting fluid flow. Lack of cutting fluid may cause Hougén 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, turn off motor and 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. This will make it difficult to restart the cut.)

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

"Babying" the cutter through the cut will only decrease tool life.

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: Use light pressure until a groove is cut. The groove then serves as a stabilizer.
 - c. Cause: Worn pilot.
Remedy: Replace pilot.
 - d. Cause: Worn cutter.
Remedy: Replace or have cutter resharpened.
 - 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
 - c. Cause: Misaligned or loose arbor set screw.
Remedy: Tighten set screw.
 - 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.
 - e. Cause: Worn motor brushes
Remedy: Replace brushes
 - f. 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.**

COMMERCIAL / INDUSTRIAL LIMITED WARRANTY

Hougen Manufacturing, Incorporated warrants its Portable Magnetic Drills and its Electro-hydraulic Hole Punchers for a period of 1 year and other products for ninety (90) days from date of purchase against defects due to faulty material or workmanship and will repair or replace (at its option) without charge any items returned. This warranty is void if the item has been damaged by accident or unreasonable use, neglect, improper service, or other causes not arising out of defects in material 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 or consequential damages. Some states do not allow exclusions of incidental or consequential damages or limitation on how long an implied warranty lasts and, if the law of such a state governs your purchase, the above exclusion and limitation may not apply 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 AUTHORIZED WARRANTY REPAIR CENTERS

Hougen Authorized Warranty Repair Centers have been factory trained to properly service and repair Hougen Portable Magnetics Drills. To locate an Authorized Warranty Repair Centers near you, please visit:

www.hougen.com



Hougen Manufacturing, Inc.

P.O. Box 2005 • Flint, MI 48501-2005

3001 Hougen Drive • Swartz Creek, MI 48473

Phone (810) 635-7111 • Fax (810) 635-8277

www.hougen.com • info@hougen.com

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