

IMPORTANT:
Read Before Using

IMPORTANT :
Lire avant usage

IMPORTANTE:
Leer antes de usar



Operating/Safety Instructions
Consignes de fonctionnement/sécurité
Instrucciones de funcionamiento y seguridad

2050



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For English Version
See page 2

Safety Symbols

The definitions below describe the level of severity for each signal word. Please read the manual and pay attention to these symbols.

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, will result in minor or moderate injury.

General Power Tool Safety Warnings

WARNING Read all safety warnings and all instructions. Failure to follow the warnings and instructions 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

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.

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.

Do not 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 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.

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.

If operating a power tool in a damp location is unavoidable, use a Ground Fault Circuit Interrupter (GFCI) protected supply. Use of an GFCI reduces the risk of electric shock.

Personal safety

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.

Use personal protective equipment. Always wear eye protection. Protective equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.

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 energizing power tools that have the switch on invites accidents.

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.

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

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

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.

Power tool use and care

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.

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.

Disconnect the plug from the power source and/or the battery pack 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.

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.

Maintain power tools. 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.

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

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.

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.

Safety Rules for Rotary Tools

Safety warnings common for grinding, sanding, wire brushing, polishing, carving or abrasive cutting-off operations:

This power tool is intended to function as a grinder, sander, wire brush, polisher, carving or cut-off tool. 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.

Do not use accessories which are not specifically designed and recommended by the tool manufacturer. Just because the accessory can be attached to your power tool, it does not assure safe operation.

The RATED SPEED of the accessories must be at least equal to the operating speed setting marked on the power tool. Accessories running faster than their RATED SPEED can break and fly apart.

The outside diameter and the thickness of your accessory must be within the capacity rating of your power tool. Incorrectly sized accessories cannot be adequately controlled.

The arbor size of wheels, sanding drums or any other accessory must properly fit the spindle or collet of the power tool. Accessories that do not match the mounting hardware of the power tool will run out of balance, vibrate excessively and may cause loss of control.

Safety Rules for Rotary Tools - (cont.)

Mandrel mounted wheels, sanding drums, cutters or other accessories must be fully inserted into the collet or chuck. If the mandrel is insufficiently held and/or the overhang of the wheel is too long, the mounted wheel may become loose and be ejected at high velocity.

Do not use a damaged accessory. Before each use inspect the accessory such as abrasive wheels for chips and cracks, sanding drum for cracks, tear or excess wear, wire brush for loose or cracked wires. If power tool or accessory is dropped, inspect for damage or install an undamaged accessory. After inspecting and installing an accessory, position yourself and bystanders away from the plane of the rotating accessory and run the power tool at maximum no-load speed for one minute. Damaged accessories will normally break apart during this test time.

Wear personal protective equipment. Depending on application, use face shield, safety goggles or safety glasses. As appropriate, wear dust mask, hearing protectors, gloves and workshop apron capable of stopping small abrasive or workpiece fragments. The eye protection must be capable of stopping flying debris generated by various operations. The dust mask or respirator must be capable of filtering particles generated by your operation. Prolonged exposure to high intensity noise may cause hearing loss.

Keep bystanders a safe distance away from work area. Anyone entering the work area must wear personal protective equipment. Fragments of workpiece or of a broken accessory may fly away and cause injury beyond immediate area of operation.

Hold the power tool by insulated gripping surfaces only, when performing an operation where the cutting accessory may contact hidden wiring or its own cord. Cutting accessory contacting a "live" wire may make exposed metal parts of the power tool "live" and could give the operator an electric shock.

Always hold the tool firmly in your hand(s) during the start-up. The reaction torque of the motor, as it accelerates to full speed, can cause the tool to twist.

Use clamps to support workpiece whenever practical. Never hold a small workpiece in

one hand and the tool in the other hand while in use. Clamping a small workpiece allows you to use your hand(s) to control the tool. Round material such as dowel rods, pipes or tubing have a tendency to roll while being cut, and may cause the bit to bind or jump toward you.

Position the cord clear of the spinning accessory. If you lose control, the cord may be cut or snagged and your hand or arm may be pulled into the spinning accessory.

Never lay the power tool down until the accessory has come to a complete stop. The spinning accessory may grab the surface and pull the power tool out of your control.

After changing the bits or making any adjustments, make sure the collet nut, chuck or any other adjustment devices are securely tightened. Loose adjustment devices can unexpectedly shift, causing loss of control, loose rotating components will be violently thrown.

Do not run the power tool while carrying it at your side. Accidental contact with the spinning accessory could snag your clothing, pulling the accessory into your body.

Regularly clean the power tool's air vents. The motor's fan will draw the dust inside the housing and excessive accumulation of powdered metal may cause electrical hazards.

Do not operate the power tool near flammable materials. Sparks could ignite these materials.

Do not use accessories that require liquid coolants. Using water or other liquid coolants may result in electrocution or shock.

Use only in well-ventilated area. Working in a safe environment reduces risk of injury.

Allow for sufficient space, at least 6", between your hand and the spinning bit. Do not reach in the area of the spinning bit. The proximity of the spinning bit to your hand may not always be obvious.

Do not touch the bit or collet after use. After use the bit and collet are too hot to be touched by bare hands.

Do not alter or misuse tool. Any alteration or modification is a misuse and may result in serious personal injury.

This product is not intended for use as a dental drill, in human or veterinary medical applications. Serious injury may result.

Safety Rules for Rotary Tools - (cont.)

Kickback and Related Warnings

Kickback is a sudden reaction to a pinched or snagged rotating wheel, backing pad, brush or any other accessory. Pinching or snagging causes rapid stalling of the rotating accessory which in turn causes the uncontrolled power tool to be forced in the direction opposite of the accessory's rotation.

For example, if an abrasive wheel is snagged or pinched by the workpiece, the edge of the wheel that is entering into the pinch point can dig into the surface of the material causing the wheel to climb out or kickout. The wheel may either jump toward or away from the operator, depending on direction of the wheel's movement at the point of pinching. Abrasive wheels may also break under these conditions.

Kickback is the result of power tool misuse and/or incorrect operating procedures or conditions and can be avoided by taking proper precautions as given below.

Maintain a firm grip on the power tool and position your body and arm to allow you to resist kickback forces. The operator can control kickback forces, if proper precautions are taken.

Use special care when working corners, sharp edges etc. Avoid bouncing and snagging the accessory. Corners, sharp edges or bouncing have a tendency to snag the rotating accessory and cause loss of control or kickback.

Do not attach a toothed saw blade. Such blades create frequent kickback and loss of control.

Always feed the bit into the material in the same direction as the cutting edge is exiting from the material (which is the same direction as the chips are thrown). Feeding the tool in the wrong direction causes the cutting edge of the bit to climb out of the work and pull the tool in the direction of this feed.

When using rotary files, cut-off wheels, high-speed cutters or tungsten carbide cutters, always have the work securely clamped. These wheels will grab if they become slightly canted in the groove, and can kickback. When a cut-off wheel grabs, the wheel itself usually breaks. When a rotary file, high-speed cutter or tungsten carbide cutter grabs, it may jump from the groove and you could lose control of the tool.

Safety warnings specific for grinding and abrasive cutting-off operations:

Use only wheel types that are recommended for your power tool and only for recommended applications. For example: do not grind with the side of a cut-off wheel. Abrasive cut-off wheels are intended for peripheral grinding, side forces applied to these wheels may cause them to shatter.

For threaded abrasive cones and plugs use only undamaged wheel mandrels with an unrelieved shoulder flange that are of correct size and length. Proper mandrels will reduce the possibility of breakage.

Do not jam a cut-off wheel or apply excessive pressure. Do not attempt to make an excessive depth of cut. Overstressing the wheel increases the loading and susceptibility to twisting or snagging of the wheel in the cut and the possibility of kickback or wheel breakage.

Do not position your hand in line with and behind the rotating wheel. When the wheel, at the point of operation, is moving away from your hand, the possible kickback may propel the spinning wheel and the power tool directly at you.

When wheel is pinched, snagged or when interrupting a cut for any reason, switch off the power tool and hold the power tool motionless until the wheel comes to a complete stop. Never attempt to remove the cut-off wheel from the cut while the wheel is in motion otherwise kickback may occur. Investigate and take corrective action to eliminate the cause of wheel pinching or snagging.

Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut. The wheel may bind, walk up or kickback if the power tool is restarted in the workpiece.

Support panels or any oversized workpiece to minimize the risk of wheel pinching and kickback. Large workpieces tend to sag under their own weight. Supports must be placed under the workpiece near the line of cut and near the edge of the workpiece on both sides of the wheel.

Use extra caution when making a pocket cut into existing walls or other blind areas.

Safety Rules for Rotary Tools - (cont.)

The protruding wheel may cut gas or water pipes, electrical wiring or objects that can cause kickback.

Safety warnings specific for wire brushing operations:

Be aware that wire bristles are thrown by the brush even during ordinary operation. Do not overstress the wires by applying excessive load to the brush. The wire bristles can easily penetrate light clothing and/or skin.

Allow brushes to run at operating speed for at least one minute before using them. During this time no one is to stand in front or in line with the brush. Loose bristles or wires will be discharged during the run-in time.

Direct the discharge of the spinning wire brush away from you. Small particles and tiny wire fragments may be discharged at high velocity during the use of these brushes and may become imbedded in your skin.

Additional Safety Warnings

⚠ WARNING Do not use router bit with the Dremel chuck.

Bit may become a projectile and cause serious injury.

GFCI and personal protection devices like electrician's rubber gloves and footwear will further enhance your personal safety.

Use only power supply number 2610Z09738 provided with the tool.

Keep handles dry, clean and free from oil and grease. Slippery hands cannot safely control the power tool.

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

Develop a periodic maintenance schedule for your tool. When cleaning a tool be careful not to disassemble any portion of the tool since internal wires may be misplaced or pinched or safety guard return springs may be improperly mounted. Certain cleaning agents such as gasoline, carbon tetrachloride, ammonia, etc. may damage plastic parts.

Risk of injury to user. The power cord must only be serviced by a Dremel Service Facility..








⚠ WARNING Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:

- Lead from lead-based paints,
- Crystalline silica from bricks and cement and other masonry products, and
- Arsenic and chromium from chemically-treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.












Symbols

IMPORTANT: Some of the following symbols may be used on your tool. Please study them and learn their meaning. Proper interpretation of these symbols will allow you to operate the tool better and safer.

Symbol	Designation / Explanation
V	Volts (voltage)
A	Amperes (current)
Hz	Hertz (frequency, cycles per second)
W	Watt (power)
kg	Kilograms (weight)
min	Minutes (time)
s	Seconds (time)
Ø	Diameter (size of drill bits, grinding wheels, etc.)
n_0	No load speed (rotational speed at no load)
n	Rated speed (maximum attainable speed)
.../min	Revolutions or reciprocation per minute (revolutions, strokes, surface speed, orbits etc. per minute)
0	Off position (zero speed, zero torque...)
1, 2, 3, ... I, II, III,	Selector settings (speed, torque or position settings. Higher number means greater speed)
0 	Infinitely variable selector with off (speed is increasing from 0 setting)
	Arrow (action in the direction of arrow)
	Alternating current (type or a characteristic of current)
	Direct current (type or a characteristic of current)
	Alternating or direct current (type or a characteristic of current)
	Class II construction (designates double insulated construction tools)
	Earthing terminal (grounding terminal)

Symbols (continued)

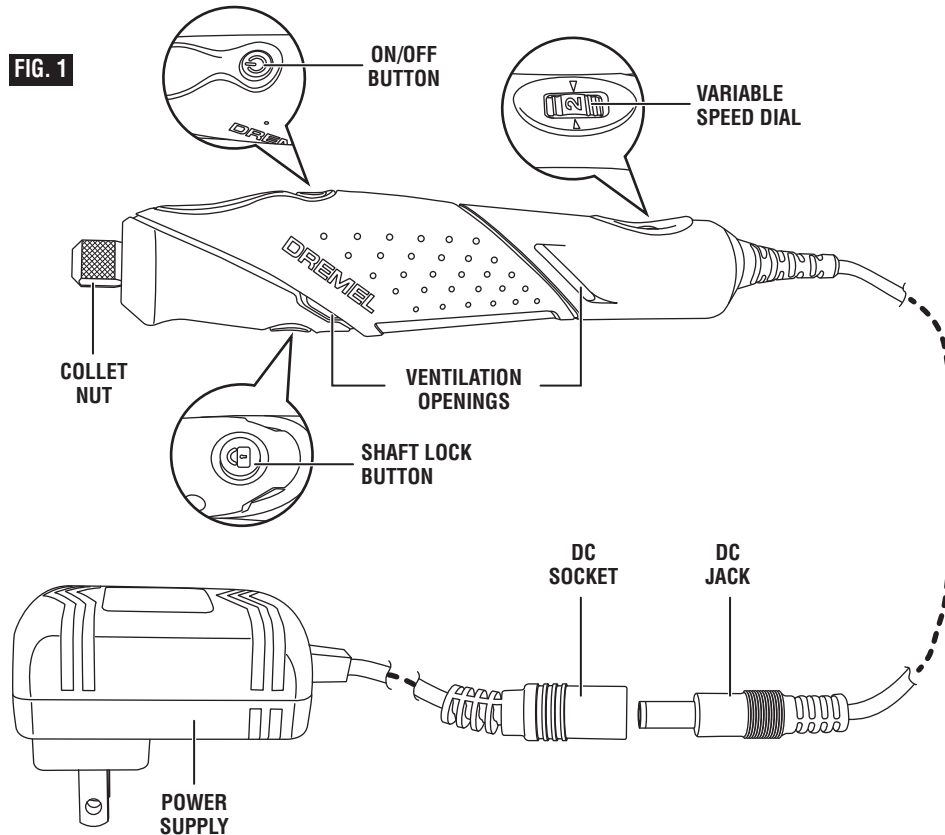
IMPORTANT: Some of the following symbols may be used on your tool. Please study them and learn their meaning. Proper interpretation of these symbols will allow you to operate the tool better and safer.

Symbol	Designation / Explanation
	Designates Li-ion battery recycling program
	Designates Ni-Cad battery recycling program
	Alerts user to read manual
	Alerts user to wear eye protection
	This symbol designates that this tool is listed by Underwriters Laboratories.
	This symbol designates that this component is recognized by Underwriters Laboratories.
	This symbol designates that this tool is listed by Underwriters Laboratories, to United States and Canadian Standards.
	This symbol designates that this tool is listed by the Canadian Standards Association.
	This symbol designates that this tool is listed by the Canadian Standards Association, to United States and Canadian Standards.
	This symbol designates that this tool is listed by the Intertek Testing Services, to United States and Canadian Standards.
	This symbol designates that this tool complies to NOM Mexican Standards.

Functional Description and Specifications

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

Model 2050 High Speed Rotary Tool



Model number	2050
Power Input rating	120V ~ 60Hz
Power Output rating	18V --- 0.5A
Rated speed	n 5,000—22,000 /min
Nut capacity	1/32"—1/8"

Assembly

⚠ WARNING Always unplug Rotary Tool before changing accessories, changing collets or servicing your Rotary Tool.

COLLETS

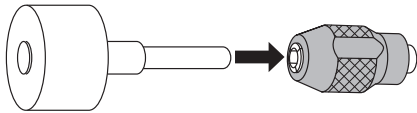
Four different size collets (see illustration), to accommodate different shank sizes, are available for your Rotary Tool. To install a different collet, remove the collet nut and remove the old collet. Insert the unslotted end of the collet in the hole in the end of the tool shaft. Replace collet nut on the shaft.

⚠ CAUTION Always use the collet which matches the shank size of the accessory you plan to use. Never force a larger diameter shank into a collet.

Note: Most rotary tool kits do not include all four collets sizes.

FIXING STUCK COLLETS

It is possible for a collet to get stuck within the collet nut especially if a collet nut is tightened onto the tool without a bit in place. If this happens, the collet can be removed from the collet nut by pushing the shank of an accessory into the hole in the collet nut. This should cause the collet to pop out of the collet nut.

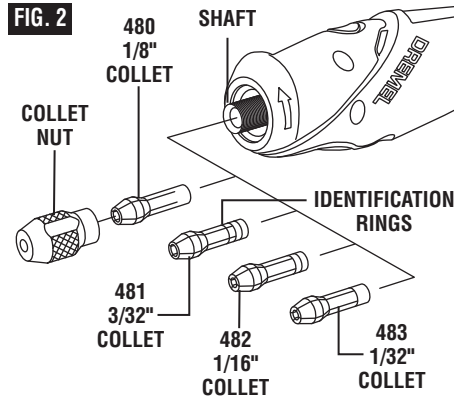


COLLET NUT

To loosen, first press shaft lock button and rotate the shaft by hand until the lock engages the shaft preventing further rotation. Your Dremel 2050 is equipped with a quick shaft lock mechanism.

⚠ CAUTION Do not engage lock while the Rotary Tool is running.

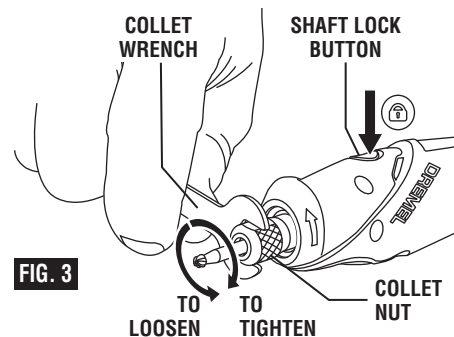
With the shaft lock engaged use the collet wrench to loosen the collet nut if necessary. The collet nut must be loosely threaded on when inserting the new one into the collet as far as possible to minimize runout and unbalance. With the shaft lock engaged, use collet wrench to securely tighten the collet nut (Fig. 3). **Avoid excessive tightening of the collet nut when there is no bit inserted.**



COLLET IDENTIFICATION CHART

Collet sizes can be identified by the rings on the back end of collet.

- 1/32" Collet has one (1) ring.
- 1/16" Collet has two (2) rings.
- 3/32" Collet has three (3) rings.
- 1/8" Collet has no rings. (Included in most tool kits on the tool)



Assembly

BALANCING ACCESSORIES

For precision work, it is important that all accessories be in good balance (much the same as the tires on your automobile). To true up or balance an accessory, slightly loosen collet nut and give the accessory or collet a 1/4 turn. Retighten the collet nut and run the Rotary Tool. You should be able to tell by the sound and feel if your accessory is running in balance.

Continue adjusting in this fashion until best balance is achieved. To maintain balance on abrasive wheel points, before each use, with the wheel point secured in the collet, turn on the Rotary Tool and run the 415 Dressing Stone lightly against the revolving wheel point. This removes high spots and trues up the wheel point for good balance.

Operating Instructions

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS DANGER - TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY FOLLOW THESE INSTRUCTIONS

For connection to a supply not in the U.S.A., use an attachment plug adapter of the proper configuration for the power outlet, if needed.

⚠ WARNING Observe all warnings and safety instructions when using the rotary tool. Failure to follow recommended procedures could result in personal injury or property damage.

Dremel 2050

Thank you for purchasing the Dremel 2050. This product was designed by the many Dremel users who passionately use their rotary tools daily. This tool was designed to give you the ultimate performance when working on versatile detailed projects.

The Dremel 2050 is a versatile craft rotary tool, which provides the best results for versatile detailed projects. The slim size of the tool allows for maximum control and allows you closer to your work piece. The lightweight design and soft grip on the tool mean the tool can be held comfortably for extended periods of use. You will appreciate the many applications that the Dremel 2050 can easily tackle.

Rotary Tool Introduction

The Rotary Tool is comfortable in the hand, and is made to accept a variety of accessories including engraving points and cutters, polishing wheels and brushes and sanding bands. Accessories come in a variety of shapes and permit you to do a number of different jobs. As you become familiar with the range of accessories and their uses, you will learn just how versatile the Rotary Tool is. You'll see dozens of uses you hadn't thought of before.

The real secret of the Rotary Tool is its speed. To understand the advantages of its high speed, you have to know that the standard portable electric drill runs at speeds up to 2,800 revolutions per minute. The Rotary Tool operates at speeds up to 22,000 revolutions per minute. The typical electric drill is a low-speed, high torque tool; the Rotary Tool is just the opposite – a high-speed, low torque tool. The major difference to the user is that in the high speed tools, the speed combined with the accessory mounted in the collet does the work. You don't apply pressure to the tool, but simply hold and guide it. In the low speed tools, you not only guide the tool, but also apply pressure to it, as you do, for example, when drilling a hole. It is this high speed, along with its compact size and wide variety of special accessories, that makes the Rotary Tool different from other tools. The speed enables it to do jobs low speed tools cannot do, such as engraving glass and sanding rough wooden edges.

Getting the most out of your Rotary Tool is a matter of learning how to let this speed work for you. T

Turning tool on and off

Insert DC jack of the rotary tool into DC socket of the power supply (Fig. 1). Insert power supply into power outlet.

Operating Instructions

FIG. 4

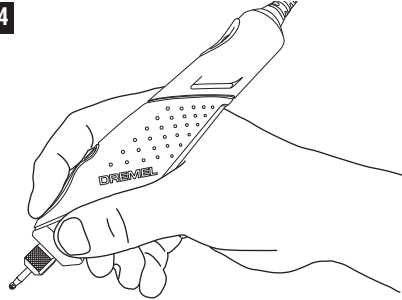
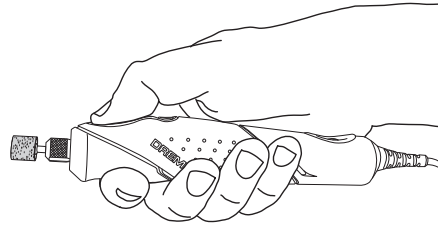


FIG. 5



The tool is turned "ON" by the on/off button (Fig. 1 and 9).

TO TURN THE TOOL "ON" press and release the on/off blue button.

TO TURN THE TOOL "OFF" press and release the on/off button.

Adjust the tool speed using the speed dial. See "Operating Speeds" Section.

Stall Protection

This tool has a stall protection feature built into it to protect the motor in the event of a stall. If you stall the tool for too long, or bind the bit in a work piece, especially at high speeds, it will automatically turn itself off.

Simply take the tool out of the material you were stalled in, turn it back on again to continue using it.

Using the Rotary Tool

The first step in learning to use the Rotary Tool is to get the "feel" of it. Hold it in your hand and feel its weight and balance. Feel the taper of the housing. This taper permits the Rotary Tool to be grasped much like a pen or pencil (Fig. 4).



Always hold the tool away from your face. Accessories can be damaged during handling, and can fly apart as they come up to speed. This is not

common, but it does happen.



Whenever you hold the tool, be careful not to cover the air vents with your hand. This blocks the air flow and causes the motor to overheat.

Practice on scrap materials first to see how the Rotary Tool's high speed action performs. Keep in mind that the work is done by the speed of the tool and by the accessory in the collet. You should not lean on or push the tool during use.

Instead, lower the spinning accessory lightly to the work and allow it to touch the point at which you want sanding or etching to begin. Concentrate on guiding the tool over the work using very little pressure from your hand. Allow the accessory to do the work.

For best control in close or detailed work, grip the Rotary Tool like a pencil between your thumb and forefinger (Fig. 4).

The "Golf Grip" method of holding the tool is used for more aggressive operations such as sanding or grinding a flat surface (Fig. 5).

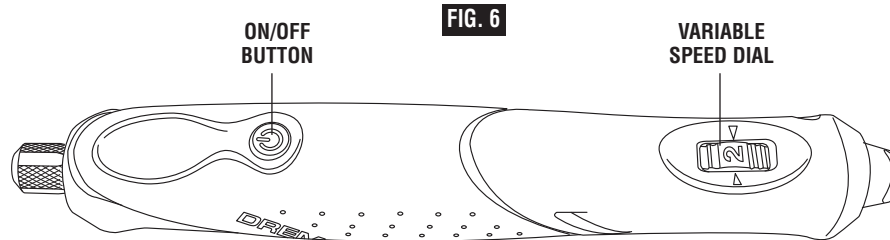
Usually, it is best to make a series of passes with the tool rather than attempt to do all the work in one pass. To sand a wooden surface, for example, pass the tool back and forth over the work, much as you would a small paint brush. Sand a little material on each pass until you reach the desired depth. For most work, the gentle touch is best. With it, you have the best control, are less likely to make errors, and will get the most efficient work out of the accessory.

To select the right speed for each job, use a practice piece of material.

VARIABLE SPEED DIAL

Your tool is equipped with a variable speed dial. The speed may be adjusted during operation by presetting the dial on or between any one of the settings.

Operating Speeds



You can refer to the charts on page 14 to determine the proper speed, based on the material being worked and the type of accessory being used. These charts enable you to select both the correct accessory and the optimum speed at a glance.

The speed of Rotary Tool is controlled by setting this dial on the housing (Fig. 6).

Settings for Approximate Revolutions

Dial Setting	Speed Range
1	5,000-7,000 RPM
2	8,000-10,000 RPM
*3	11,000-14,000 RPM
4	15,000-18,000 RPM
5	19,000-22,000 RPM

* Maximum Setting for Wire Brush.

Needs for Slower Speeds

Certain materials, however, (some plastics and precious metals, for example) require a relatively slow speed because at high speed the friction of the accessory generates heat and may cause damage to the material.

Slow speeds (15,000 RPM or less) usually are best for polishing operations employing the felt polishing accessories. They may also be best for working on delicate projects as "eggery" work, delicate wood carving and fragile model parts. (All brushing applications require lower speeds to avoid wire discharge from the holder.)

Higher speeds are better for carving and shaping wood.

Hardwoods, metals and glass require high speed operation, and drilling should also be done at high speeds.

The point to remember is this: Many applications and accessories in our line will provide the best performance at full speed, but for certain materials, applications, and accessories, you need slower speeds, which is the reason our variable speed models are available.

To aid you in determining the optimum operational speed for different materials and

different accessories, we have constructed a series of tables that appear on page 14. By referring to these tables, you can discover the recommended speeds for each type of accessory. Look these tables over and become familiar with them.

Ultimately, the best way to determine the correct speed for work on any material is to practice for a few minutes on a piece of scrap, even after referring to the chart. You can quickly learn that a slower or faster speed is more effective just by observing what happens as you make a pass or two at different speeds.

Some rules of thumb in regard to speed:

- Polishing, buffing and cleaning with any type of bristle brush must be done at speeds not greater than 15,000 RPM to prevent damage to the brush.
- Increasing the pressure on the tool is not the answer when it is not performing as you think it should. Perhaps you should be using a different accessory, and perhaps an adjustment in speed would solve the problem. Leaning on the tool does not help.

Let speed do the work!

Speed Dial Settings

Set speed dial to the setting recommended for the material being worked and the catalog number of accessory being used. For speed range for each setting please refer to "Operating Speeds" on page 13.

High Speed Cutters								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
191	5	5	2	3-4	5	-	-	-
125	5	3-4	2	3-4	3-4	-	-	-

Engraving Cutters								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
105	5	5	5	2	3-4	-	-	-

Diamond Wheel Points								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
7103	5	5	-	-	-	5	5	5

Polishing Accessories								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
414, 429	-	-	-	3-4	3-4	3-4	3-4	3-4

Wire Brushes								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
428	2-3	2-3	1	2-3	2-3	-	-	-

Sanding Bands and Discs								
Catalog Number	Soft Wood	Hard Wood	Laminates /Plastics	Steel	Aluminum, Brass, etc.	Shell/ Stone	Ceramic	Glass
430, 431, 438	1-5	1-5	1-4	5	5	1-5	1-5	-

Maintenance

Service

⚠ WARNING NO USER SERVICE-ABLE PARTS INSIDE. Preventive maintenance performed by unauthorized personnel may result in misplacing of internal wires and components which could cause serious hazard. We recommend that all tool service be performed by a Dremel Service Center. **SERVICEMEN:** Disconnect tool and/or charger from power source before servicing.

D.C. MOTORS

The motor in your tool has been engineered for many hours of dependable service. To maintain peak efficiency of the motor, we recommend it be examined every six months. Only a genuine Dremel replacement motor specially designed for your tool should be used.

Cleaning

⚠ WARNING To avoid accidents, always be sure the tool is turned "OFF" before cleaning. The tool may be cleaned most effectively with compressed dry air. **Always wear safety goggles when cleaning tools with compressed air.**

Ventilation openings and switch levers must be kept clean and free of foreign matter. Do not attempt to clean by inserting pointed objects through opening.

⚠ CAUTION Certain cleaning agents and solvents damage plastic parts. Some of these are: gasoline, carbon tetrachloride, chlorinated cleaning solvents, ammonia and household detergents that contain ammonia.

Extension Cords

⚠ WARNING If an extension cord is necessary, a cord with adequate size conductors that is capable of carrying the current necessary for your tool must be used. This will prevent excessive voltage drop, loss of power or overheating. Grounded tools must use 3-wire extension cords that have 3-prong plugs and receptacles.

NOTE: The smaller the gauge number, the higher the cord capacity.

RECOMMENDED SIZES OF EXTENSION CORDS 120 VOLT ALTERNATING CURRENT TOOLS

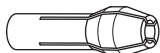
Tool's Ampere Rating	Cord Size in A.W.G.				Wire Sizes in mm ²			
	Cord Length in Feet				Cord Length in Meters			
	25	50	100	150	15	30	60	120
3-6	18	16	16	14	0.75	0.75	1.5	2.5
6-8	18	16	14	12	0.75	1.0	2.5	4.0
8-10	18	16	14	12	0.75	1.0	2.5	4.0
10-12	16	16	14	12	1.0	2.5	4.0	—
12-16	14	12	—	—	—	—	—	—

Dremel Accessories

⚠ WARNING Use only Dremel®, high-performance accessories. Other accessories are not designed for this tool and may lead to personal injury or property damage.

Store accessories in a dry and temperate environment to avoid corrosion and deterioration.

The number and variety of accessories for the Rotary Tool are almost limitless. There is a category suited to almost any job you might have to do and a variety of sizes and shapes within each category which enables you to get the perfect accessory for every need.



COLLETS

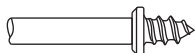
If you expect to use a variety of accessories, we recommend that in the beginning you

purchase a complete set of four collets. Store these so that you will have the proper size of collet for any accessory or drill bit you want to use. **Currently, the 1/8", 3/32", 1/32" and 1/16" collets accommodate all of the available Dremel accessories. 1/8" collets are included in most rotary tool kits.**

Dremel Accessories (Continued)

MANDRELS

A mandrel is a shank with a threaded or screw head, which are required when you use polishing accessories, cutting wheels, sanding discs, and polishing points. The reason mandrels are used is that sanding discs, cutting wheels and similar accessories must be replaced frequently. The mandrel is a permanent shank, allowing you to replace only the worn head when necessary, thus saving the expense of replacing the shaft each time.



Screw Mandrel No 401

This is a screw mandrel used with the felt polishing tip and felt polishing wheels. 1/8" shank.



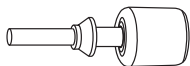
Small Screw Mandrel No 402

This is a mandrel with a small screw at its tip, and is used with emery and fiberglass cutting wheels, sanding discs and polishing wheels. 1/8" shank.



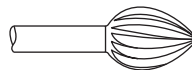
EZ Lock Mandrel No 402

The Dremel EZ Lock makes accessory changes easy as PULL - TWIST - RELEASE. The one-piece mandrel design simplifies the process of changing cutting wheels, buffs and detail abrasive brushes (EZ Lock compatible accessories).



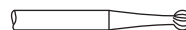
EZ Drum™ Mandrel No EZ407SA

The Dremel EZ Drum makes accessory changes easy as PULL - INSERT - PRESS DOWN. The one-piece mandrel design simplifies the process of changing sanding bands.



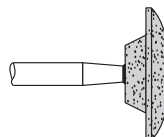
High Speed Cutters

Available in many shapes, high speed cutters are used in carving, cutting and slotting in wood, plastics and soft metals such as aluminum, copper and brass. These are the accessories to use for freehand routing or carving in wood or plastic, and for precision cutting. Made of high quality steel. 1/8" shank.



Engraving Cutters

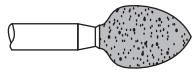
This group has a wide variety of sizes and shapes, and are made for intricate work on ceramics (greenware), wood carvings, jewelry and scrimshaw. They often are used in making complicated printed circuit boards. They should not be used on steel and other very hard materials but are excellent on wood, plastic and soft metals. 1/8" shank.



Aluminum Oxide Grinding Stones (red/brown)

Round, pointed, flat — you name the shape and there is one available in this category. These are made of aluminum oxide and cover virtually every possible kind of grinding application. Use them for sharpening lawn mower blades, screwdriver tips, knives, scissors, chisels and other cutting tools. Use to remove flash from metal castings, deburring any metal after cutting, smoothing welded joints, grinding off rivets and removing rust. These grinding stones can be resharpened with a dressing stone. In machine shops, high speed drills and cutters normally are ground with aluminum oxide wheels. 1/8" shank.

Dremel Accessories (Continued)



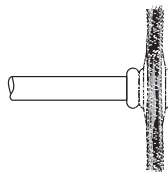
Silicon Carbide Grinding Stones (blue/green)

Tougher than aluminum oxide points, these are made especially for use on hard materials such as glass and ceramics. Typical uses might be the removal of stilt marks and excess glaze on ceramics and engraving on glass. 1/8" shank.



Diamond Wheel Points

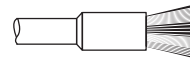
Excellent for fine detail work on wood, jade, ceramic, glass and other hard material. Bits are covered with diamond particles. 1/8" shanks. (Not recommended for drilling)



Wire Brushes

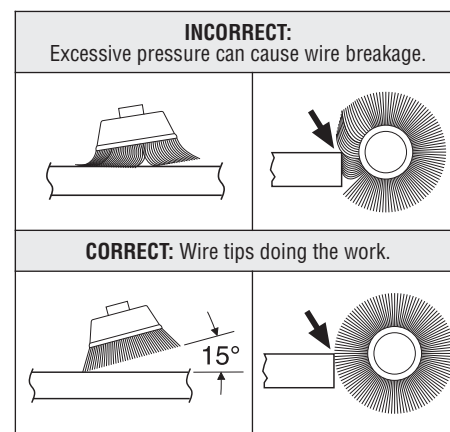
⚠ WARNING Maximum operating speed 15,000/min. Allow brush to run at 15,000/min for one minute before use. Refer to Operating Speeds section for proper tool speed setting.

Three different shapes of wire brushes are available. The three shapes come in three different materials: stainless steel, brass and carbon wire. The stainless steel perform well on pewter, aluminum, stainless steel, and other metals, without leaving "after-rust". Brass brushes are non sparking, and softer than steel; making them good for use on soft metal like gold, copper and brass. The carbon wire brushes are good for general purpose cleaning.



Bristle Brushes

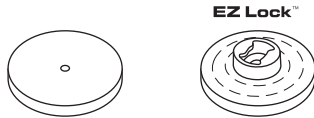
These are excellent cleaning tools on silverware, jewelry and antiques. The three shapes make it possible to get into tight corners and other difficult places. Bristle brushes can be used with polishing compound for faster cleaning or polishing.



Brushing Pressure

1. Remember, the tips of a wire brush do the work. Operate the brush with the lightest pressure so only the tips of the wire come in contact with the work.
2. If heavier pressures are used, the wires will be overstressed, resulting in a wiping action; and if this is continued, the life of the brush will be shortened due to wire fatigue.
3. Apply the brush to the work in such a way that as much of the brush face as possible is in full contact with the work. Applying the side or edge of the brush to the work will result in wire breakage and shortened brush life.

Dremel Accessories (Continued)



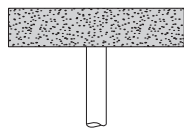
Polishing Accessories

These include an impregnated polishing point and an impregnated polishing wheel for bringing metal surfaces to smooth finish; a felt polishing tip and felt polishing wheel, and cloth polishing wheel, all used for polishing plastics, metals, jewelry and small parts. Also included in this group is a polishing compound (No. 421) for use with the felt and cloth polishers.

Polishing points make a very smooth surface, but a high luster is obtained using felt or cloth wheels and polishing compound.

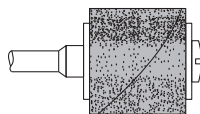
For best results polishing accessories should be used at speeds not greater than 15,000 RPM.

No polishing compound is needed when using the 425 Polishing Wheel.



Aluminum Oxide Abrasive Wheels

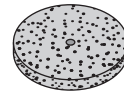
Use to remove paint, deburr metal, polish stainless steel and other metals. Available in medium grit. 1/8" shank.



Sanding Accessories

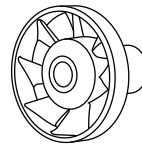
Sanding discs in fine, medium and coarse grades are made to fit mandrel No. 402 and EZ407. They can be used for nearly any small sanding job you might have, from model making to fine furniture finishing. In addition, there is the drum sander, a tiny drum which fits into the Rotary Tool and makes it possible to shape wood, smooth fiberglass, sand inside curves and other difficult places, and other sanding jobs. You replace the sanding bands on the drum as

they become worn and lose their grit. Bands come in fine medium and coarse grades. Flapwheels grind and polish flat or contoured surfaces. They are used most effectively as a finishing sander after heavier surface sanding and material removal is completed. Flapwheels come in fine and coarse grades. Buffs are a great finishing accessory for cleaning and light sanding. They work effectively on metal, glass, wood, aluminum and plastics. Coarse and medium buffs are sold together. All buffs are sold individually. **Do not exceed 15,000 RPM in speed. 1/8" shank.**



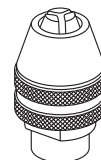
Grinding Wheel

Use for deburring, removing rust, and general purpose grinding. Use with Mandrel #402.



Collet Fan

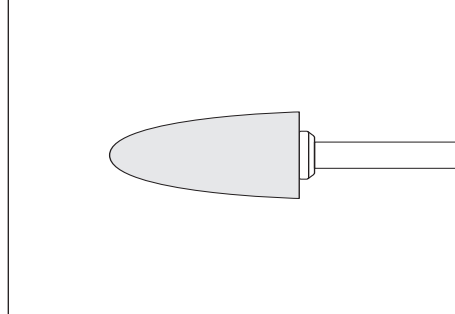
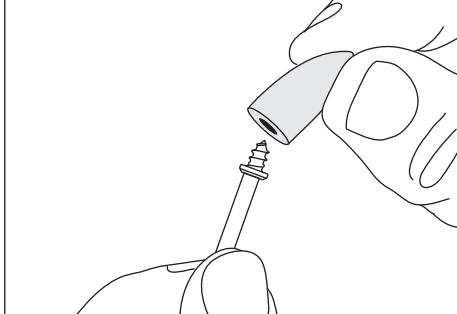
Blows dust away for greater visibility to work piece. Great for sanding, engraving and carving. Do not use dust blower to stop or slow down the tool. Do not contact dust blower with fingers or workpiece during use.



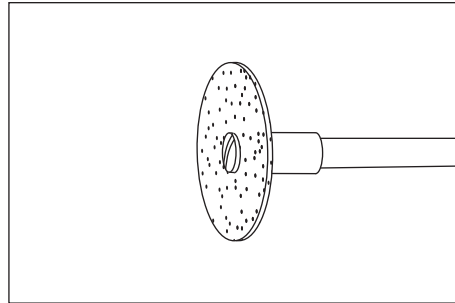
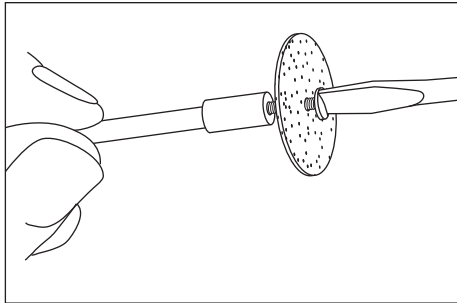
Dremel Chuck

This chuck allows you to quickly and easily change accessories on Dremel Rotary Tools without changing collets. Accepts accessories with 1/32" - 1/8" shank. Read instruction manual. Insert and securely tighten the shank of the accessory well within the jaws of the chuck.

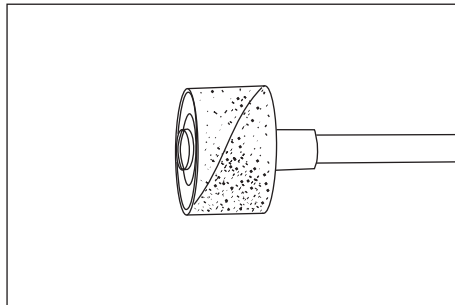
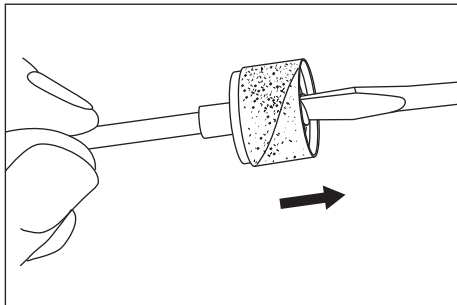
Replacing Screw Mandrel Accessories



Mandrel No. 401 is used with the felt polishing tip and wheels. Thread the tip on to the screw carefully. The felt tip must thread down straight on the screw Mandrel, and be turned all the way to the collar.



Mandrel N° 402 has a small screw at its tip, and is used with sanding discs.



To replace a band on the **Drum Sander**, loosen the screw without removing it to contract the drum then slide the old band off. Slide the new sanding band on and then expand the drum by tightening the screw once again.

⚠ WARNING Before each use, check to make certain that all components are assembled to accessory shank and that the drum is sufficiently expanded to secure the band during use. If sanding band is loose on the drum during operation it may “fly” off and strike you or bystanders.

EZ Lock™ Operating Instructions

EZ Lock™ Mandrel No. EZ402 has a spring-loaded sleeve and is used with sanding disks, abrasive buffs and polishing cloth.

⚠ WARNING Always make sure the rotary tool is “OFF” and disconnect the plug from the power source or the battery pack from the tool before changing accessories. Such preventative safety measures reduce the risk of starting the power tool accidentally.

To load accessory:

1. Insert EZ Lock™ mandrel 1 into collet as deep as possible and tighten Dremel collet nut (Fig. A1).

Note: There is a blue spacer 2 that will bottom out on the collet nut, setting the mandrel to the correct depth.

2. Pull spring-loaded sleeve 3 DOWN towards tool with one hand and hold. You can brace the tool on the body or workbench for extra leverage (Fig. A2).
3. With the other hand, align bow tie interface 4 on mandrel with metal bow tie interface 5 on bottom of accessory 6 (Fig. A2).
4. Place accessory on the mandrel to a point just below the bow tie on the mandrel 4 and twist 90 degrees until the bow tie interface 5 on the accessory 6 aligns with the sleeve 3. Release sleeve 3. Accessory 6 should lock in place (Fig. A3).

⚠ WARNING Incorrect seating of accessory on mandrel may lead to personal injury or property damage. To check for proper seating, hold shaft lock button 7 and twist the accessory 6. The accessory 6 will not be able to rotate on mandrel.

To unload accessory:

1. Pull spring-loaded sleeve 3 DOWN toward tool with one hand (Fig. A3).
2. Hold sleeve 3 down while twisting accessory 6 90 degrees (Fig. A3).
3. Remove accessory 6 (Fig. A3).

During use

Avoid damage to EZ lock™ mandrel by not letting it contact the workpiece.

FIG. A1

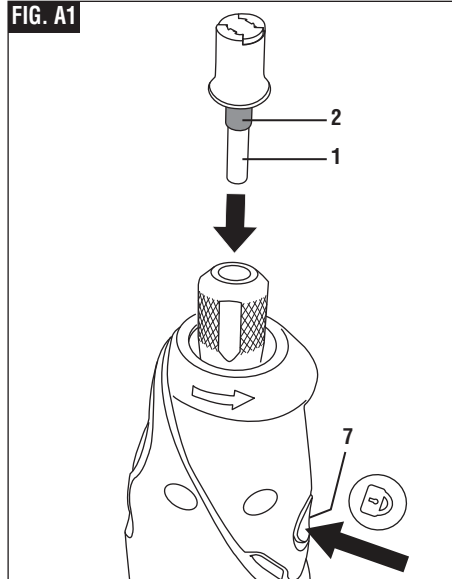


FIG. A2

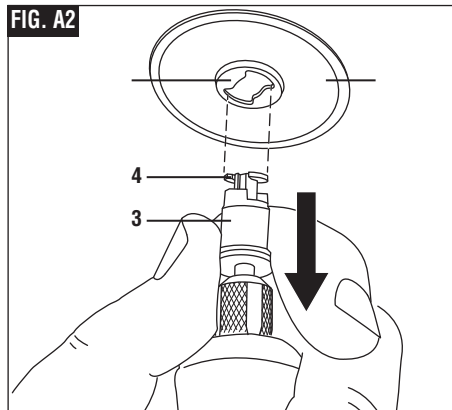
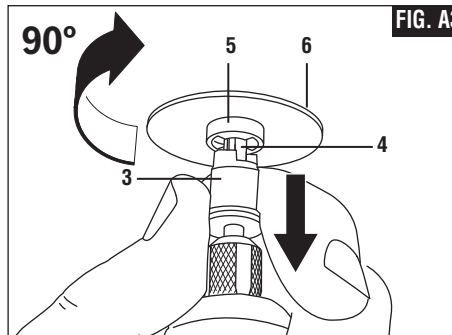


FIG. A3



EZ Drum™ Operating Instructions

EZ Drum™ Mandrel No. EZ407SA has a spring loaded sleeve and is used with sanding bands.

⚠ WARNING Always make sure the rotary tool is "OFF" and disconnect the plug from the power source or the battery pack from the tool before changing accessories. Such preventative safety measures reduce the risk of starting the power tool accidentally.

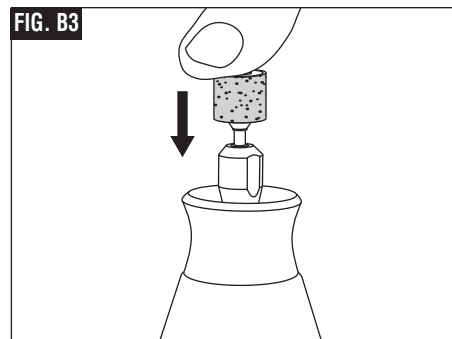
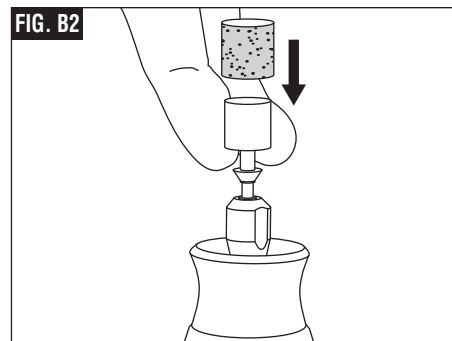
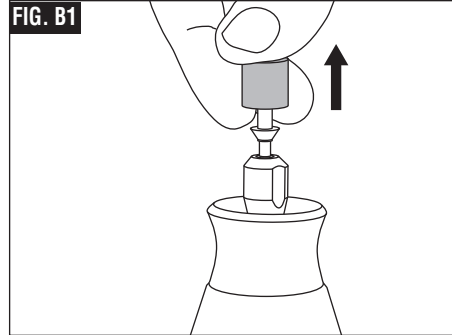
Always make sure accessory is properly seated on mandrel before use. Incorrect seating of accessory on mandrel may lead to personal injury or property damage.

To load accessory:

1. As indicated, place two fingers underneath the mandrel and pull firmly up. This will place the EZ Drum™ in the "unlocked" position (Fig. B1).
2. Keeping two fingers beneath the mandrel, slide the sanding band down until the entire blue mandrel is covered (Fig. B2).
3. To return to "locked" position, press firmly down on the top of the mandrel (Fig. B3).

Removing the sanding band on the mandrel:

1. Place two fingers underneath the mandrel and pull firmly up. This will place the EZ Drum™ in the "unlocked" position (Fig. B1).
2. Sanding band will now easily slide off mandrel (Fig. B2). Do not squeeze sanding band when removing from EZ Drum™ mandrel. This can lead to rubber band pulling off mandrel and becoming inoperable.



Dremel® Limited Warranty

Your Dremel product is warranted against defective material or workmanship for a period of two years from date of purchase. In the event of a failure of a product to conform to this written warranty, please take the following action:

1. DO NOT return your product to the place of purchase.
2. Carefully package the product by itself, with no other items, and return it, freight prepaid, along with:
 - A. A copy of your dated proof of purchase (please keep a copy for yourself).
 - B. A written statement about the nature of the problem.
 - C. Your name, address and phone number to:

We recommend that the package be insured against loss or in transit damage for which we cannot be responsible.

This warranty applies only to the original registered purchaser. DAMAGE TO THE PRODUCT RESULTING FROM TAMPERING, ACCIDENT, ABUSE, NEGLIGENCE, UNAUTHORIZED REPAIRS OR ALTERATIONS, UNAPPROVED ATTACHMENTS OR OTHER CAUSES UNRELATED TO PROBLEMS WITH MATERIAL OR WORKMANSHIP ARE NOT COVERED BY THIS WARRANTY.

No employee, agent, dealer or other person is authorized to give any warranties on behalf of Dremel. If Dremel inspection shows that the problem was caused by problems with material or workmanship within the limitations of the warranty, Dremel will repair or replace the product free of charge and return product prepaid. Repairs made necessary by normal wear or abuse, or repair for product outside the warranty period, if they can be made, will be charged at regular factory prices.

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This warranty gives you specific legal rights and you may also have other rights which vary from state to state. The obligation of the warrantor is solely to repair or replace the product. The warrantor is not liable for any incidental or consequential damages due to any such alleged defect. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you.

For prices and warranty fulfillment in the continental United States, contact your local Dremel distributor.

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Importado a México por: Robert Bosch, S. de R.L. de C.V.
Calle Robert Bosch No. 405 - 50071 Toluca, Edo. de Méx. - México
Tel. 052 (722) 279 2300 ext 1160 / Fax. 052 (722) 216-6656



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