



**OPERATION & INSTRUCTION MANUAL
PRECISION CUTTER**

MICRACUT 152

EC Declaration of Conformity

Manufacturer : Metkon Instruments Inc.
Address : Demirtas Dumlupinar Organize Sanayi Bolgesi
Ali Osman Sonmez Cd. No: 14 Bursa / TURKEY
Model No : MICRACUT 152

Herewith declares that;

Precision Cutter

- is in conformity with the provisions of the Machinery Directive **(directive 2006/42/EEC)**, as amended, and with national implementing legislation;
- is in conformity with the provisions of the Low Voltage Directive **(directive 2014/35/EU)**, as amended, and with national implementing legislation;
- is in conformity with the provisions of the EMC Directive **(directive 2014/30/EU)**, as amended, and with national implementing legislation;

And furthermore declares that

- the following [parts/clauses of] standards have been applied

EN ISO 12100:2010, TS EN 60204-1, TS EN IEC 61000-6-2, TS EN 61000-6-4

Authorized Person: ERCIN SENAY

Position: Manager of Research and Development Department

Year: 2019

Bursa / Turkey



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DESCRIPTION

Design

MICRACUT 152 precision cutters are used for precise and deformation-free cutting of "Metals, Ceramics, Electronic Components, Crystals, Composites, Biomaterials, Sintered Carbides, Minerals, etc." MICRACUT 152 has its place in virtually any metallurgical, geological, electronics, research, biomedical or industrial laboratory. The applications are endless.

- Modern and sturdy design
- Easy to use control panel with ergonomic turn-knob
- Precise micrometer with digital readout
- Gravity feed system
- Automatic stop at the end of cut
- Transparent protection hood with magnetic safety switch
- Inbuilt recirculation coolant tank

MICRACUT 152 accommodates diamond and abrasive wheels up to 175 mm (7") diameter and the speed range is between 50 and 1500 rpm. Modern-looking touch pad controls with ergonomic turn knob allows fast and easy setting of wheel speed and increases productivity. The gravity feed loading design minimizes sample deformation. The sliding weight arm with counterweight allows precise force application. The digital micrometer enables the operator to set the cutting width with a resolution of 1 micron. The digital micrometer is interchangeable and the customer can mount other types of micrometers if and whenever required. The coolant tray is removable from the instrument for easy cleaning. MICRACUT 152's cutting chamber is fully enclosed by a transparent hood. Blade dresser is optionally available. At the end of the cut, the motor automatically stops and an audible signal notifies the operator.

Optional Cutting Table Attachment is available for manual cutting of extra flat large specimens and PCB's.

MICRACUT 152 precision cutters are capable of cutting most materials such as, brittle or ductile metals, hard or soft metals, composites, ceramics, rocks, biomaterials, laminates, etc. They are designed for cutting all types of materials with minimal structural deformation.

The structural integrity of the sample is maintained through MICRACUT 152's design and operation. Additionally, low kerf-loss and sample holding versatility makes the MICRACUT 152 an essential part of the modern day laboratory. The cut surface is ready for microscopic examination with minimal polishing.

Safety

MICRACUT 152 precision cutters has the highest safety standards. The magnetic safety switch does not allow the motor to be started unless transparent hood is closed. If transparent hood is opened during cutting, the motor immediately stops automatically. Easily accessed and operated emergency stop button ensures immediate shut down. Soft closing feature of transparent hood protects fingers from risk of injury.



Technical Data

Model Order No	MICRACUT 152 16 05
Disc Diameter, mm	Ø175 mm
Cutting Capacity, mm	Ø50 mm
Cutting Motor Power, W	100 W
Disc Speed, RPM	50 RPM - 1500 RPM
Cutting Method	Chop
Parallel Cutting in X-Axis	Yes
X-Axis Positioning, mm	25 mm
Cooling Unit, lt	850 ml (integrated)
Dimensions, WxDxH, mm	510 x 430 x 340h mm
Weight, kgs	28 kgs

Warranty

The MICRACUT 152 is guaranteed against defective material or workmanship for a period of 12 months from the date of receipt by the customer or latest 18 months after the shipping date. THE WARRANTY IS NOT VALID IF INSPECTION SHOWS EVIDENCE OF MISUSE OR UNAUTHORIZED REPAIR. Warranty covers only replacement of defective materials. Should this unit need to be returned to our factory for service contact your distributor for authorization and include the following details: Serial Number of the unit, Invoice number and date. Transport costs belong to the customer.

NOTE

Disabling Magnetic Safety switch on the MICRACUT 152 will void warranty.



Using any other brand consumables apart from METKON brand (cut-off wheels, cooling fluids) this warranty will not cover:

- Painting deformation and rusting on the components
- Deformation and corrosion occurred on Motor, Bearings, Clamping Devices, bearing housings, etc.

Safety Precautions

Read the below instructions carefully before use.

- Place the machine on a sturdy and safe table.
- The equipment must be installed in compliance with local safety regulations.
- Only use approved METKON accessories and consumables to achieve max. safety and lifetime.
- The equipment is not for use with saw-blade type cut off wheels.
- Follow the instructions and safety regulations when lifting and carrying the equipment.
- Be sure that the sample is securely fixed in the clamping devices. Handle the large and sharp samples in a safe way.
- The equipment emits only moderate noise. But during the cutting process the emitted noise may be higher. Wearing hearing protection is recommended.
- Disconnect the electrical connection before servicing the equipment.
- After cutting operation heat and sharp edges may occur. Using protection gloves are recommended.
- Do not bypass the safety switch.
- Follow the periodically maintenance and keep the hood open when not working.



NOTE

METKON Instruments Inc. can make any changes without notice on the equipment, accessories, consumables and miscellaneous products. Consequently; visual or written information on the instruction manuals, technical materials, catalogues, website, product videos and other marketing materials may show inconsistencies and may be different from the product.

INSTALLATION & SET UP

Unpacking & Checking Contents of Package

Carefully unpack and check contents of the package. If any components are missing or damaged, save the packing list and materials and advise your distributor and the carrier of the discrepancy.

- Power Cable, 1.8 mt, 1 piece
- Combination Wrench, 17mm, 2 pieces
- Brush, 1 piece
- Screwdriver, 6.5 x 25, 1 piece
- Dressing Stone, 10 x 10 x 100 mm, 1 piece
- Hex Key, 4 mm, 1 piece
- Hex Key, 2.5 mm, 1 piece



WARNING

The MICRACUT 152 weighs 28 kgs and be sure that there are enough people to safely lift the unit from the shipping carton. It is recommended to wear safety shoes during transportation

The MICRACUT 152 is shipped completely assembled except its digital micrometer for safely shipment.

- MICRACUT 152 is only available as bench top.
- MICRACUT 152 should be placed on a sturdy and safe platform. Please be sure that the platform is large enough and can stand it's weight.
- You can see the dimensions and weight of MICRACUT 152 as below:

Dimensions	W	D	H
	510 mm	430 mm	340 mm
Weight	Approx. 28 kgs		

Step by Step Unpacking

If Sent in a Carton Box

- Carefully remove the outer stretch wrap, cut the strips and remove the cover.



- Open the box and remove filling materials inside the box.



- Remove the equipment from the box by holding wooden base at the bottom. Please consider weight of equipment when lifting it. Lift the equipment by considering the center of gravity.



- Equipment is fixed on the wooden base with bolts. Carefully remove these bolts.



- Carefully remove the protective bubble wrap. Be careful not to damage equipment while using a knife.



If Sent in a Wooden Case

- Carefully remove the outer stretch wrap.



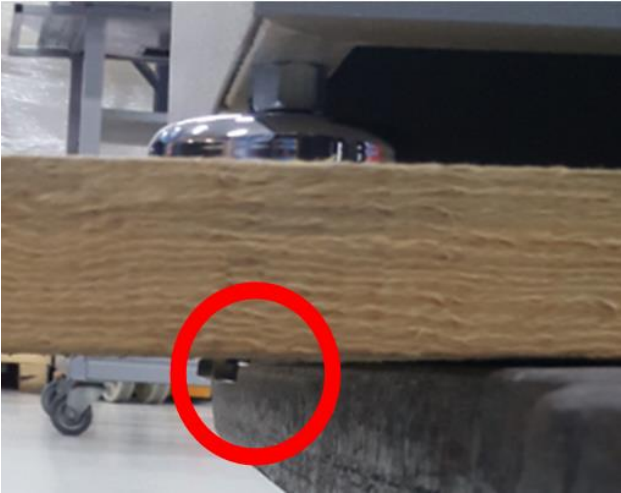
- Open the top cover of wooden case by removing screws.



- Open the back, front and side covers in the same way and remove filling materials inside the case.



- Equipment is fixed on the wooden base with bolts. Carefully remove these bolts.



- Carefully remove the protective bubble wrap. Be careful not to damage equipment while using a knife.



Installation and Set-Up



CAUTION

Follow approved procedures and take all necessary preventive safety measures when lifting and installing this equipment. Improper lifting can result equipment damage.

The MICRACUT 152 is shipped completely assembled except its digital micrometer for safely shipment. It is designed for table-top placement. After unpacking select a smooth location to place the MICRACUT 152. Then, adjust the leveling feet to make the equipment parallel [set-square]. Locate the MICRACUT 152 with convenient access to a grounded type electrical receptacle.

Electrical Installation

Before making electrical connections, check that the voltage and frequency stated on the specification plate correspond to the local voltage and frequency. Check that the values for one-phase grounded voltage, is compatible with the intended electrical supply before installation.

- Connect the mains cable of the MICRACUT 152 to an appropriate electrical outlet.
- Close the door. Turn the instrument on from the main switch, which is on the backside of the instrument.
- See [Cutting Operation](#) section for operation.
- Press "START" and "STOP" buttons and observe from the window that the cutting wheel shaft rotates clockwise when looked at from the left.



ATTENTION

Connect the unit to the grounded mains voltage. The MICRACUT 152 requires a 1-phase electrical supply.



WARNING

Electrical Shock Hazard. A qualified electrical technician should perform all hard wiring and electrical maintenance

- Disconnect the power supply before making any electrical adjustments.
- Make sure that the supply voltage and frequency is correct. Check the values from the machine identification plate located at the rear of the machine

Voltage / Frequency	Operational Power Range	Fuse Rating
115 V, 50/60 Hz. 1 ph.	100 - 125 V	6 A [C Type]
230 V, 50/60 Hz. 1 ph.	200 - 250 V	6 A [C Type]



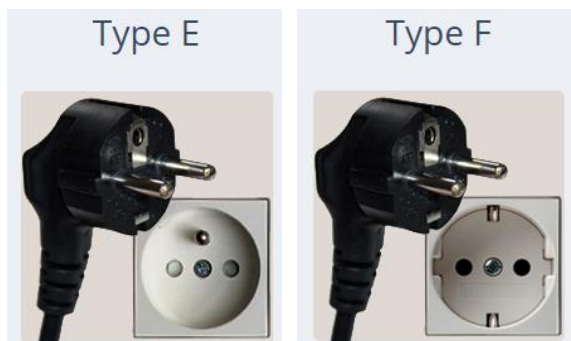
Identification Plate

- Connect the equipment to the grounded mains voltage. Power cord will be supplied with the equipment.
- Length of the power cable is 1.8 meters



Power Cable

- You can see suitable power sockets as below. If you have not suitable power socket, in this case you should supply a suitable power cord.



Cooling Unit

The MICRACUT 152 uses the "drag" principle of lubrication with the lubricant carried to the sample on the periphery of the wheel. METCOOL Cutting Fluid reduces cutting time and produces superior quality cuts. Its use promotes effective lubrication which allows the diamond particles to cut cleanly. Coolant is lost during the cutting process because of evaporation or left in the cutting chamber or components. For the best cutting performance and corrosion protection, replace the coolant regularly (max. 1 month)

IMPORTANT



ONLY water-based cooling fluids has to be used. Use of alcohol or oil based flammable cooling fluids are strictly FORBIDDEN because; the vapor is potentially EXPLOSIVE when ignited.



CAUTION

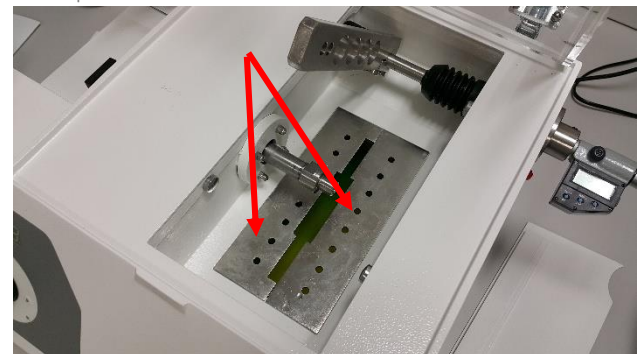
Do not run the pump dry for more than 30 seconds.

For removing the water tank, please follow the below steps:

- Remove the cutting-wheel.



- Open the covers which are under the wheel



- Open the side cover.



- Open the RED fixers of the coolant tank to release the tank.



- Pull out the coolant tank for re-filling the cutting fluid.



- Fill the Lubricant Pan with Fluid to a level that will immerse wheel approximately 6-7 mm.
- Fill the tank with a mixture at a ratio of 95% clean water + 5% METCOOL cutting fluid until the mixture level comes to 5 mm below the top. Water hardness should be 5-20 °dH in German Hardness and should not contain bacteria and chemical salts. METCOOL ratio should not less than 3% and should not more than 6%. If concentration is below 3%, corrosion may occur inside the cutting chamber. If concentration is more than 6%, foaming effect may occur.
- Push the recirculation tank into place again and follow the steps backwards.
- The recirculation unit should be checked for cooling water every day.

Mounting of Micrometer

MICRACUT 152 is shipped completely assembled except its digital micrometer for shipment safety. Please follow the following steps to install the digital micrometer:

- Insert the battery to the micrometer.



Micrometer

- Insert the micrometer to its flange on the equipment and push towards to the body of the equipment.



- When you completely push the micrometer tighten the screw for completing the installation. Do not tighten too much as the micrometer will not be able to push the cutting arm.



- To arrange the sensitivity of the micrometer, tighten or loosen the screw indicated on the below photo.



Mounting Clamping Devices

Metkon offers a wide range of specimen holders for the MICRACUT 152.

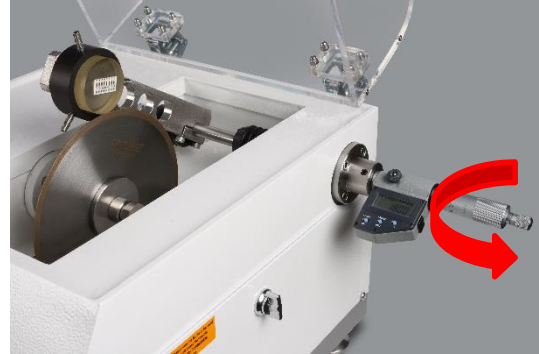
- Loosen the Set screw and slip the Counter Balance Weight to the rear of the Shaft to hold the Support arm in an upright position.
- Select the proper Chuck for the particular application and clamp the Specimen in place.
- Attach the loaded Chuck to the Support arm with the Chuck Mounting Thumb Screw.
- After the Chuck is secured, move the holding arm to the far left by adjusting the Micrometer Head.
- Slide the Counter-Balance Weight toward the front of the unit until balance is achieved and tighten the Set Screw.
- Fasten the Sample properly:** the samples must never move around in the specimen holder during cutting. Movements may lead to damage of the cut-off wheel and sample will invariably cause a bad cutting quality.

Cut-Off Switch Mechanism

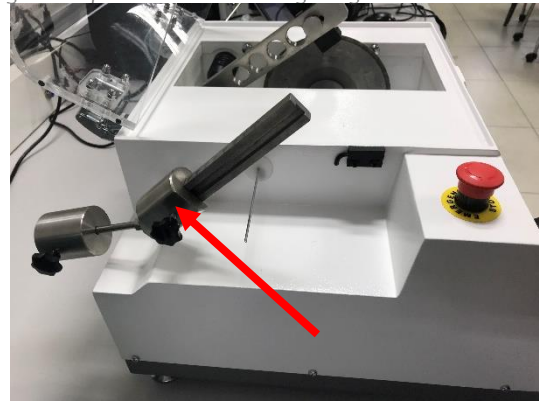
When the specimen is cut completely, the support arm drops to the lowest position due to the effect of gravity. The support arm falls on the wire switch, allowing the motor to stop automatically.

Micrometer Adjustment and Weight Selection

- Adjust the Micrometer to position the specimen for cutting.



- Weight can be applied to the work in increments of 100 grams by movement of sliding weight.



- Intermediate Weights can be applied through careful adjustment of the Counter-Balance Weight at the rear of the Support Arm.



Counter-Balance Weight

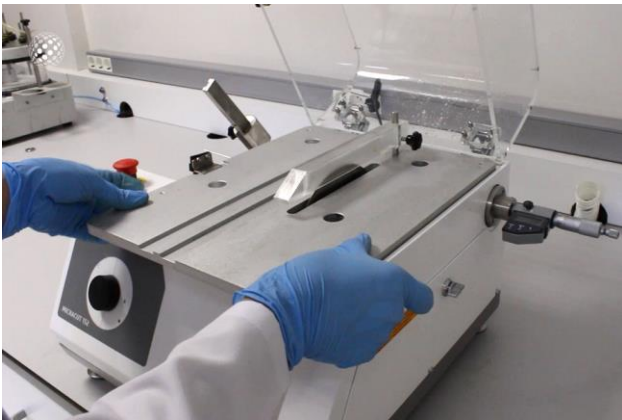
- Heavy Loads cause surface damage to the Specimen, therefore light weights are recommended.

Mounting PCB Cutting Table

- Disassemble the screws of the cover and remove the cover of the MICRACUT 152. If your sample has small size, you do not have to remove the cover.



- Place the table on the equipment. Be sure that the magnetic switch is securely closed.



- You can easily and safely cut flat specimens with this table.



Safety

The MICRACUT 152 machines conform to the highest standards of safety regulations. The cutting motor cannot be started unless the hood is closed. In case of opening the hood during cutting operation, the cutting motor immediately stops.



Safety Switch

Noise Level

Approximately 62 dBa is measured at idle running at a distance of 1 meter from the machine.

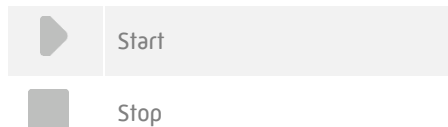
CONTROL PANEL

MICRACUT 152 has a modern looking and easy to use operator panel with buttons and knob. It has specially designed to increase operator comfort and maximize productivity.



MICRACUT 152 Control Panel

Control Button Functions



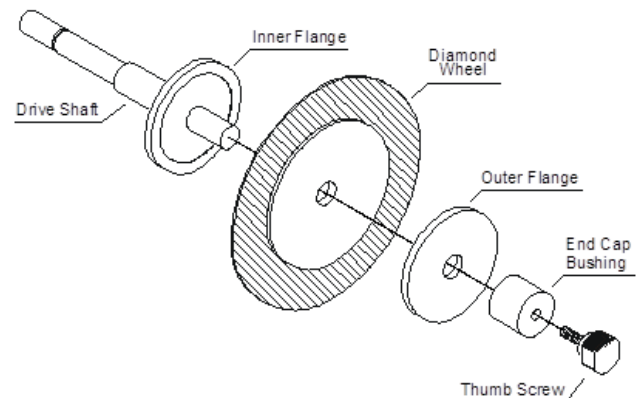
Operation Parameter Ranges

Cutting Wheel Speed (RPM) : 50 – 1500 RPM

OPERATION

Mounting of Cutting Wheel

- Remove Thumb Screw, End Bushing and Outer Flange from Drive Shaft.
- Install wheel on Drive Shaft against Inner Flange relieved surface.
- Slip on Outer Flange and End cap Bushing, then hand tighten Thumb Screw to complete installation.



Mounting of Abrasive/Diamond/CBN Wheel

Flanges provide support for the wafering blades. Failure to provide adequate flange support may result in curved cuts and damaged blades.



NOTE

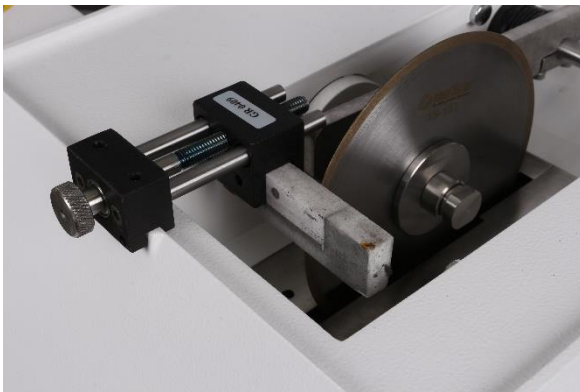
Before reinstallation of a wheel, the Cap Bushing, Screw and Flanges should be cleaned in a mild detergent solution to remove adherent particles from previous sawing. This will help prevent misalignment of wheel, which might cause poor-quality cuts.

Blade Dressing

New wheels must be dressed before making sample cuts. Dressing removes normal smeared matrix metal and exposes the abrasive grain to assure free cutting. Blade dressing exposes the abrasive grain to ensure free cutting. New wafering blades should be dressed several times and older blades dressed as required based on the specimen material properties. When cutting metal samples, it may be necessary to dress after each cut.

Regular dressing of diamond and CBN cut-off wheels is important to keep a consistent quality of the cuts. A badly maintained and poorly dressed cut-off wheel requires a higher cutting pressure and will, therefore, generate more frictional heat. It may also bend, causing deformed cuts.

Please fasten the dressing stick to the special sample holder and mount this sample holder to the equipment as shown in below picture. Tighten the special sample holder to the main body of the instrument with the set screws. Start the machine in low speed. You can do the dressing within the same time you are doing a cutting operation.



Dressing Unit

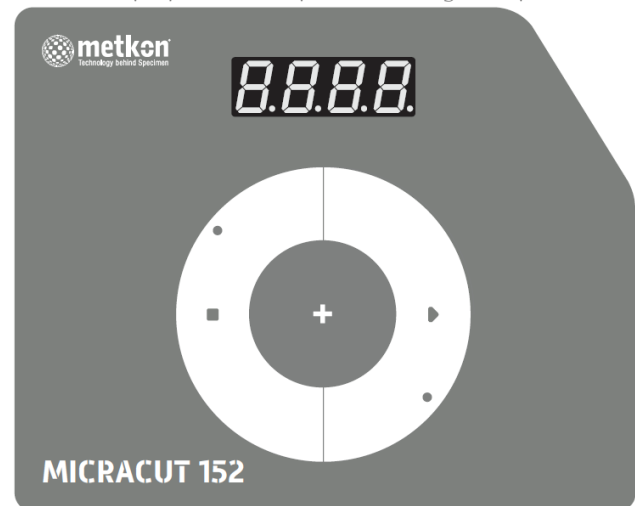
Cutting Operation

- Turn on the equipment from the main power switch at the backside of the machine.



Main Power Switch

- The display of the front panel will be lightened up.



MICRACUT 152

- Set the disc speed by turning the knob from the front panel to the desired speed in RPM.
- Press the turn-knob to save the disc speed.
- Fast speeds tend to damage the specimen surface.
- Settings between 500-800 RPM are recommended for general use.
- After the disc speed is set, press the "Start" button and carefully lower the Specimen Arm onto the wheel to start cutting.
- For safety reasons, shut the transparent cover on top of the cutting chamber.
- Adjust the position of the sample by the help of the micrometer located at the right side of the equipment.
- When the cut is completed, the Cut-Off Switch Arm is automatically depressed which stops the MICRACUT 152.

SERVICE AND MAINTENANCE

Maintenance

The MICRACUT 152 Precision Cutter should be cleaned periodically to prevent build-up of cutting residue and cutting fluids. Exterior painted surfaces including the cutting chamber may be cleaned with non-abrasive household cleaners.

The protective hood and touch screen control panel should be cleaned with a soft cloth.

Use only "METCOOL II" cutting fluids to obtain maximum corrosion protection and cooling properties. Use only "METCOOL-NF" cutting fluid if you continuously cut reactive metals like copper, brass, cobalt, aluminum, tungsten carbide, etc... METCOOL-NF has perfect corrosion protection for the machine when cutting these parts.

The precision of diamond and CBN cut-off wheels and thus the cut depends on how carefully the following instructions are observed:

- Never expose the cut-off wheel to overload, such as heavy mechanical load, or heat.
- Store the cut-off wheel in a dry place, horizontally on a plane support, preferably under light pressure.
- A clean and dry cut-off wheel does not corrode. Therefore, clean and dry the cut-off wheel before storing. If possible, use ordinary detergents for the cleaning.

When the cutter is not in use for a long time, **keep the hood raised so that the unit dries.**

Daily Maintenance

- At the end of the working day, please clean the cutting chamber. After cleaning it is recommended to dry the clamping devices and the cutting chamber.
- Leave the hood open when you are finished with cleaning.
- If the cooling fluid level is low, please add fluid.
- After cutting operation please control diamond cutting wheel and dress the surface of the wheel if necessary.



Recirculation Cooling Tank

Weekly Maintenance

- Remove the cooling fluid tank. Drain the cutting fluid completely and clean all the swarf and particles. Prepare the new cutting fluid suspension and fill.



- Prepare the new cutting fluid suspension in a ratio of 97 % water + 3 % METCOOL II cutting fluid.
- Do not add only water, because concentration become low which may cause corrosion. Add mixture at a ratio of 97% water + 3% METCOOL II cutting fluid. Water hardness should be 5-20 °dH in German Hardness and do not contain bacteria and chemical salts.

Monthly Maintenance

- The clamping vises need monthly lubrication with a, water-resistant automotive grease. [Never use grease containing Molybdenum Disulphide or graphite, which can impair the clamping ability of the Vise.]
- Remove the cooling fluid tank. Drain the cutting fluid completely, and clean out all the swarf and fine particles. Prepare anew cutting fluid suspension.

Troubleshooting

ERROR	DESCRIPTION	ACTION
The cut-off wheel is not rotating	The hood is left open	Close the hood properly.
Burning remarks on the cutting surface	The cut-off wheel is not compatible with the cut piece	Use proper cut-off wheel. See consumables section for the correct cut-off wheel selection.
	High cutting force	Lower the force applied
	Insufficient cooling	Check that there is enough cooling fluid in the tank.
Unwanted burrs on the sample	The cut-off wheel is not compatible with the cut piece	Use proper cut-off wheel. See consumables section for the correct cut-off wheel selection.
	High cutting force at the end of cycle	Reduce the cutting force before the end of the operation
	Improper clamping of the sample	Support the sample from both sides.
Cut-off wheel breaks	Incorrect mounting of the cut-off wheel	Check the mounting of the cut-off wheel and be sure that the nut and the flange is set properly
	The cut-off wheel is not compatible with the cut piece	Use proper cut-off wheel. See consumables section for the correct cut-off wheel selection.
	High cutting force	Lower the force applied.
	Insufficient cooling	Check that there is enough cooling fluid in the tank.
The Lexan window is blurred	Insufficient cleaning	Clean the Lexan window with a mild soapy water (Do not use the cooling fluid)

ACCESSORIES AND CONSUMABLES

Clamping Devices and Accessories

METKON offers a number of special clamping devices and specimen vices for use with our MICRACUT precision cutters. Please see below, the clamping devices and accessories table, as well as clamping device drawings.

Order No	Specimen Vises for MICRACUT 152
GR 0213	Cutting Table Attachment for manual cutting of extra flat specimens and PCB 's.
GR 0409	Dressing Unit for MICRACUT 152
YM 1590-00	Dressing Stone
GR 0400	Universal Specimen Vise
GR 0401	Specimen vise with double parallel vice for long specimens
GR 0402	Specimen vise for round and mounted specimens, \varnothing 32mm
GR 0403	Specimen vise for irregular shaped specimen
GR 0404	Specimen vise for adhering specimens
GR 0405	Specimen vise for biomedical samples
GR 0406	Swivel arm unit for angular cutting
GR 0430	Specimen vise (teardrop shape) for specimens 18-40mm
GR 0431	Specimen vise (teardrop shape) for specimens 5-20mm
GR 0434	Specimen vise for round cylindrical specimens (up to 40 mm diameter)
GR 0453	Fastener vise for longitudinal sectioning of screws, fasteners, tubes, etc. from 12 to 45 mm. in length
GR 0410	Set of Flanges, \varnothing 75 mm, suitable for 12.7 and 25.4 mm arbor diameters.

Order No	Spare Part Kit for MICRACUT 152
GR 1960	Recommended Set of Spare Parts, MICRACUT 152 *SWITCH, 1 pc. *DIGITAL MICROMETER, 0-25, 0.001 mm, 1 pc. *BELT, 10 mm, 1 pc. *PULLEY GEAR, \varnothing 12, 1 pc. *BEARING, 6001, 1 pc. *SPRING, MICROMETER MOTION, 1 pc.

Consumables

Abrasive cut-off wheels

The most commonly used abrasives for the cutting of different materials are SiC and Al₂O₃. Silicon carbide is suitable for non-ferrous metals, whereas Aluminum oxide is preferred for ferrous metals. Hard wheels are used for cutting soft materials while soft wheels are recommended for cutting harder materials.

Order No	CODE	DESCRIPTION
18-150	TRENO-HP	Ø150 mm, for Non-Ferrous Metals, Stainless Steels, 10 pcs/pack
18-151	TRENO-MP	Ø150 mm, for Medium and Hardened Steels, 10 pcs/pack



Diamond and CBN Cut-off Wheels

Metal bonded wheels are used for cutting brittle materials, such as ceramics or minerals, while resin bonded wheels are used for ductile materials, such as sintered carbides or composites that contain predominantly hard phases. Several factors are important for choosing the appropriate wafering blade.

These include:

"High & low concentration metal bonded diamond wheels", "Diamond size [fine or medium]", "blade diameter" and "blade thickness". The diamond concentration is important because it directly affects the load, which is applied during cutting. For example, brittle materials such as ceramics require higher effective loads to section, whereas ductile materials such as metals require more cutting points. The result is that low concentration blades are recommended for sectioning hard brittle materials such as ceramics and high concentration blades are recommended for ductile materials containing a large fraction of metal or plastic.

CBN wheels are usually used for cutting very hard metals.

Order No	CODE	DESCRIPTION
19-100	DIMOS	Ø100 mm, Diamond Cut-off wheels [Metal Bonded, high conc.]
19-125	DIMOS	Ø125 mm, Diamond Cut-off wheels [Metal Bonded, high conc.]
19-130	DIMOS	Ø125 mm, Diamond Cut-off wheels [Metal Bonded, low conc.]
19-126	DIMOS	Ø125 mm, Diamond Cut-off wheels [Resin Bonded, high conc.]
19-150	DIMOS	Ø150 mm, Diamond Cut-off wheel [Metal Bonded, High Concentration]
19-157	DIMOS	Ø150 mm, Diamond Cut-off wheel [Metal Bonded, Low Concentration]
19-151	DIMOS	Ø150 mm, Diamond Cut-off wheel [Resin Bonded, High Concentration]
19-127	CBN	Ø125 mm, CBN Cut-off wheels [Metal Bonded, high conc.]
19-152	CBN	Ø150 mm, CBN Cut-off wheels [Metal Bonded, high conc.]

Cutting Fluid

Cutting fluid is one of the most important thing to protect sample surface and the machine. Its function is to reduce heat generation between cut-off wheel and specimen surface during cutting operation. Second function is to prevent corrosion from specimen surface and the machine parts. METCOOL II has special anti-corrosion additives as well as perfect cooling properties. It is nature friendly, boron-free and anti-bacterial. METCOOL-NF provides perfect corrosion protection when cutting reactive metals like copper, brass, cobalt, aluminum, tungsten carbide, etc... Mixing ratio is 95% water + 5% METCOOL II.

Order No	CODE	DESCRIPTION
19-902	METCOOL	Nature Friendly Soluble Oil, 5 lt.
19-905	METCOOL II	Nature Friendly Soluble Oil, 1 lt.
19-906	METCOOL-NF	Nature Friendly Soluble Oil, 5 lt. Perfect corrosion protection for reactive metals like copper, brass, cobalt, aluminum, tungsten carbide, etc.



TECHNICAL DOCUMENTATION

Customer Service

Our factory-trained assembly personal is at your disposal for customer service.
Please contact the following address:

Head Quarter

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Demirtas Dumlupinar Organize Sanayi Sitesi

Ali Osman Sonmez Cad. No: 14 Bursa/TURKEY

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QUARTER CENTURY OF
EXPERIENCE