McGan Technology, LLC

Operator's Handbook for

Micromed MM-5kV

High Voltage ELECTROSURGICAL POROSITY (HOLIDAY) DETECTOR

Complies with the requirements of:
ASTM G62-87(1998), NACE RP0274-98,
NACE RP0490-2001, NACE RPO188-99, ASTM D4787-93(1999),
JIS G-3491, JIS G-3492, ANSI/AWWA C214-89,
ANSI/AWWA C213-94 and ISO 2746:1998

CE Marked Compact Detectors comply with the requirements
of EMC Directives 89/336/EEC EMC and its amending directives.

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INTRODUCTION

Thank you for choosing the Micromed MM-5kV for the inspection and detection of defects, pinholes, porosity in the applied surface insulating coatings of your electrosurgical equipment, wires and cables.

McGan has designed this instrument with care, to provide ongoing insulation defect detection for a wide variety of protective coatings currently in use with various electrosurgical equipment, wires and cables. Under reasonable operating care, the unit will provide many years of trouble free detection.

McGan welcomes user inquiries and recommendations for this product.

1.0 SAFETY PRECAUTIONS

All hand-held high voltage test equipment should be operated by responsible, trained and authorized personnel. As an added precaution always use surgical gloves while assembling and operating the unit to avoid the possibility of receiving a “shock”.

CAUTION

THE MM-5kV UNIT SHOULD NOT BE USED IN AN ELEVATED OXYGEN ENVIRONMENT. THE UNIT EMITS AN ELECTRICAL SPARK AS PART OF ITS OPERATION AND A FIRE MAY OCCUR IN HIGH LEVELS OF OXYGEN.

The MM-5KV can output up to 5,000 volts. Should the operator accidentally make contact with the test electrode, they may experience a mild shock or zap, and in order to avoid this possibility, the wearing of rubber gloves is recommended or stabilize the unit to a workbench under test using an insulated clamp.

DO NOT operate the unit if you are not in good health. People with a cardiac condition should not operate this unit.

DO NOT operate this unit if you have a pacemaker.

This unit should only be used for checking the porosity, or electrical breakdown, of dielectric or insulating materials (examples include jacketing material, powder coatings).

DO NOT use this unit around other machinery. An electrical shock may cause the operator to fall and injure themselves.

DO NOT operate this unit around people that are not directly involved in the testing procedure.

ONLY USE a standard 9V battery or the Optional McGan Technology’s external rechargeable battery pack (p/n 5VEBC-0016) and the associated AC power adapter (p/n 5VACP-0014). Both items supplied as optional equipment.

DANGER

DO NOT use the test equipment in any combustible or flammable atmosphere i.e. flammable anaesthetics, as a test voltage can cause an arc or spark to be generated and an explosion could result.

ELECTRICAL SHOCK HAZARD

DO NOT remove the unit's cover! Refer servicing to qualified factory service personnel.

2.0 GENERAL OPERATING PRINCIPLES

Q1. On what principle does the Micromed MM-5KV operate?

A1. The unit is a low frequency high voltage generator that delivers a stabilised preset DC output via a probe to an inspection electrode probe. As the electrode probe moves over the coating surface, if it encounters a pin hole, crack or bare spot, a small current flows actuating a visible (nonhazardous) spark at the point of contact and a visible (light) and audible alarm in the unit sound.

Q2. How is the applied voltage pre-set?

A2. The voltage required is pre-set manually on the unit to a minimum level determined by the thickness of film of the coated (insulated) product and its generic type ie: PVC, Teflon, FRP or polyethylene for electrosurgical "rods" (i.e. laparoscopic instruments) or polymer, nylon, powder coating or other coatings for cutting or electrocautery equipment handles (i.e. bipolar forceps) . Detailed instructions are set out in the section of this handbook marked **Recommended Minimum Voltage**. It is important to follow these instructions in setting voltages as some surfaces have a much higher dielectric strength than others - consequently offering a high resistance to the conduction of electricity. Applied test voltages should only be sufficient to detect faults, otherwise overstressing of the dielectric strength may occur with possible surface rupturing

Q3. What are the minimum and maximum film thicknesses that can be tested with the Micromed MM-5kV?

A3. This depends on the type of coating applied. A minimum of 150μm is recommended

Q4. Do damp coatings or moist and humid conditions affect the operation of the Micromed MM-5kV?

A4. As wet surfaces are generally conductive, this could affect the unit operationally. Atmospheric moisture is unlikely to do so.

Q5. What checks are available on the functioning of the Micromed MM-5kV?

A5. A range of tests can be undertaken by employing an appropriate detector crest meter, including voltage output and visual display, continuity of leads etc.

Q6. Is the high voltage application destructive to any of the generally used sealing coatings?

A6. No! The applied voltage to the coating is non-destructive, provided the voltage applied is within the parameters set down in the **Recommended Minimum Voltage** section of this handbook for the type and thickness of coating.

3.0 INSPECTION PROCEDURES

The highly sensitive **Micromed MM-5KV** has been designed to locate pinholes, voids and thin spots in high resistance coatings applied to the surface of low resistance materials.

Applied coats on surgical leads and instruments should be identified as to type, thickness tested and visually inspected and accepted to ensure the applicable voltages can be set prior to high voltage porosity tests being carried out.

It is recommended that hospitals establish a testing program and document tests for future reference.

Operation

1. Connect the probe and ground leads to the unit.
2. Connect the ground clamp to the metallic substrate of the item to be tested – substrate should be grounded.
3. Attach the probe (ring or brush) to the base unit port (red).
4. Turn the unit on.
5. Select voltage.
6. Place the probe near the metal substrate.
7. A spark should occur (if not re-check all leads).
8. The unit should now be ready for use.
9. Test on the coated surface by lightly moving the probe (brush or ring electrode) slowly (approximately 3 feet every 4 seconds) across the surface of the unit under test.

A fault is indicated by:

- A spark at the probe – this can usually be seen and heard.
- A light flashes on the front panel of the unit.
- An audible sound – the buzzer is mounted within the base unit.

Operational Hints:

- Probes must be kept in full contact with the surface, gaps in or between the probe and the coating may result in flaws being undetected.
- Wire brush and ring electrodes should be kept in good condition. Use light brush strokes with the brush electrode there is no need to push hard against the insulation material during test. Use the edge of the brush instead of the tip to cover more area and prolong the life of the brush wires.
- The unit should always be switched off prior to removing and repositioning of the ground lead.
- After repositioning the ground lead, either probe should always be ‘flashed’ on the substrate to prove a good contact has been made.
- Wet and contaminated coatings should not be tested until dry and clean.

4.0 SPECIFICATIONS

Adjustable Voltage Unit:

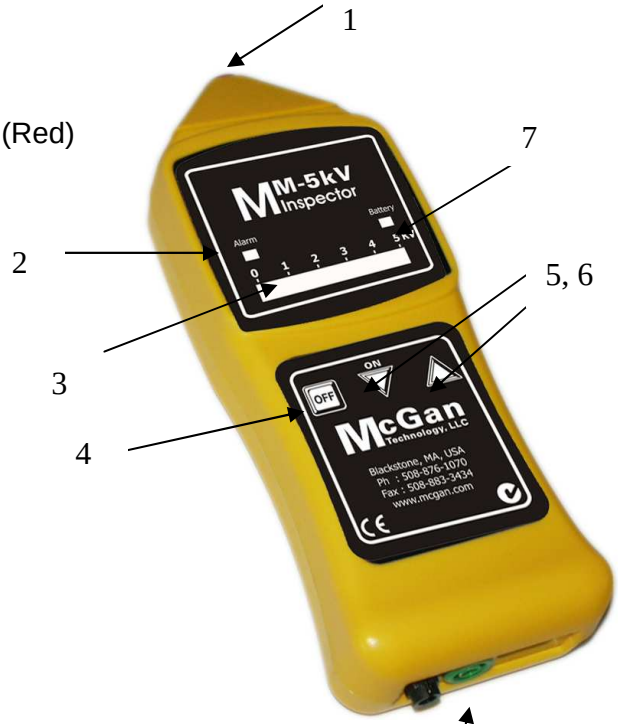
Weight:	1.01 lbs (460 grams)
Voltage:	0 to 5kV fully adjustable
Short circuit:	Test current 0.1mA max
Power supply:	Internal 9V Battery
Power supply option:	12V external rechargeable battery with Adaptor
Dimensions:	8.27 x 2.95 x 1.38 inches (210 x 75 x 35mm)[1]
Alarms:	Audible, Visual – front panel light
Probe lead option:	3 ft (1 meter) PVC insulated wire with mini-handle
Ground lead:	6ft (2 meter) with a clamp fitted to one end
Probes:	* Medical style Brass Wire 8mm wide brush, trim length of 25mm (note: probe size\shape may vary depending on user requirement) * Ring Electrode with brass wire * Tri-Hole Electrode (optional)
Kit Case:	Supplied (may vary in style)

1 Excludes brush or ring or Tri-Hole dimensions

5.0 CONTROL LAYOUT

Micromed MM-5kV Front Panel

1 Probe Port (Wire Brush or Ring)- Optional HV wire (Red)
2 Visual LCD alarm
3 Voltage Indicator
4 OFF Switch
5 ON Switch/Voltage Down Control
6. Voltage Up Control
7. Battery Indicator
8. DC Input for External Battery Connection
9. Ground Lead Input Socket (Green Wire)
10. Rechargeable External Battery Pack (optional)
11. AC Power Adaptor (optional)



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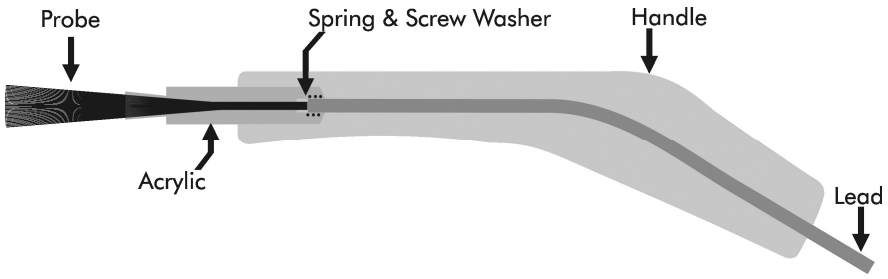
Optional Probe Handle Diagram



Note: Probe handle size\shape and colour may vary.

6.0 RECOMMENDED MINIMUM VOLTAGES

for testing specified thickness of film of various Coating Products International Standards NACE RP0188-99 derived table

Total Dry Film Thickness		Suggested Inspection
(µm)	(mils)	(V)
200 to 280	8 to 11	1,500
300 to 380	12 to 15	2,000
400 to 500	16 to 20	2,500
530 to 1,000	21 to 40	3,000
1,010 to 1,390	41 to 55	4,000
1,420 to 2,000	56 to 80	6,000

The above table should be taken as a GUIDE only.
It is recommended that the whole of this standard be used entitled “New Protective Coatings on Conductive Substrates”

McGan recommends that the voltage be between 2.5 and 3.0V for most jacketed electrosurgical instruments and around 1.5V for powder coated instruments.

7.0 Battery Requirements/Replacement/Options

Battery Type: The MM-56kV is supplied with an alkaline battery and is estimated to provide approximately 8 hours of use. Suggested 9V battery replacements are: lithium ion, alkaline, Rechargeable NiMH or other high quality long lasting battery.

Battery Replacement: On the back of the base unit turn the white screw counter-clock wise and open the panel. Carefully remove the 9V battery and replace with a new one making sure to properly align the negative and positive ports. Close the panel and turn the white screw clock wise. Turn the unit on to make sure it is properly working.

Options: Use the Optional UL approved AC power adaptor (p/n 5VACP-0015) and the external rechargeable battery (p/n 5VEBC-0016) which will by-pass the 9V battery. This external battery DOES NOT re-charge the 9V battery but is an alternate power supply that needs to be plugged into a 120v/220v outlet.
ORDER McGan AC Power Adapter Part Number 5VACP-0015 and Rechargeable battery Part Number 5VEBC-0016.

The rechargeable battery pack is shipped with a minimal charge. It will take approximately 10 hours to fully charge.
Discharge (usage) will be around the 15 hours. The actual time may vary according to usage and number of defects found.

8.0 SPECIAL NOTES

DO NOT operate the MM-5kV unit with the AC-DC Adaptor plugged into the rechargeable battery pack. Recharge the battery pack, disconnect the AC-DC Adaptor from the wall outlet and battery pack and plug the battery pack into the base of the MM-5kV unit.

LED Battery indicator light will illuminate when the 9V battery or the rechargeable battery pack is low on power. If the power from either the 9V or rechargeable external battery is too low then the LED will not have enough power and will not illuminate.

IF the MM-5kV fails to operate replace the 9V battery or use a fully charged battery pack.

9.0 TROUBLESHOOTING

Symptom	Possible Cause	Solution
No Display	Dead or low charged battery	Replace 9V battery or use a fully charge battery pack
Alarm sounds continuously during test	Surface might be slightly conductive, damp or salty Probe moved too fast	Wash, clean and dry the surface Move Probe approximately 3 ft (1m) every 4 seconds
No Alarm on fault	Voltage too low	Increase voltage sensitivity
No spark at probe tip	Damaged leads Poor connections Dead or low charged battery	Repair or replace leads Clean and reconnect Replace battery or use fully charged battery pack
No Battery indicator light and unit does not function	Dead or low charged battery	Replace battery or use fully charged battery pack

10.0 WARRANTY

Subject to the warranty conditions below Micromed MM-5KV is warranted by the Manufacturer to be free from defects arising from faulty design, material, or workmanship for a period of 12 months from the date of original purchase by the user.

Probes and leads are warranted for 2 months. They are consumable items, and subject to wear and deterioration during use. The life of these parts can be extended by keeping them in a clean and dry condition. The probes and leads must be stored in suitable protective containers. During use, avoid “scrubbing” the probe along the surface of the work-piece.

WARRANTY CONDITIONS

During the warranty period listed above McGan or it’s authorized service representative will make good any defects covered by this warranty.

McGan or it’s authorised service representative will decide if there are any defects in design, material or workmanship.

This warranty only applies provided the instrument has been used in accordance with the manufacturers operating handbook recommendations.

This warranty does not cover damage, malfunction or failure resulting from misuse, neglect, abuse or if the unit or its accessories are used for a purpose for which it was not designed and no repairs, alterations or modifications have been attempted other than by the manufacturer under an authorized service.

This warranty applies only to the original user/ buyer and is not transferable.

This warranty does not cover any service that is needed after an accident, alterations, misuse, fire or floods.

This warranty is the only one given by McGan and no one has the authority to change, or add to, the obligations and liabilities listed in it.

This warranty does not cover batteries, probe handle brushes, ring (electrodes) or leads which are subject to wear.

During the warranty period McGan or its authorized service representative will bear the transportation cost for the return of instrument/s repaired under warranty back to the user’s premises within the country of purchase. If it is found that the unit has failed for any reason stated above or the warranty period has expired then the user is obligated for all repair and transportation costs.

HOW TO MAKE A WARRANTY CLAIM

Defective goods must be returned to McGan or an authorized service representative at the Purchaser’s expense. The goods must be accompanied by the Purchaser’s written order describing the defect and authorizing McGan or its authorized service representative to invoice the Purchaser for any charges not covered by the warranty.

The purchasers order must also include the model and serial numbers of the instrument and address of the Purchaser and date of purchase.

Upon receipt at the service point the instrument will be examined to determine the nature and cause of the defect.

If the defect is covered by the warranty, a repair will be initiated at McGan's or its authorized service representative expense. If the defect is not covered by the warranty, McGan or its authorized service representative will quote the Purchaser for a replacement unit or for the cost of the repair, and will not proceed until written acceptance of the quotation is received.

11.0 SERVICE AND MAINTENANCE.

CARE AND MAINTENANCE

This equipment is protected against hostile environments and is designed for prolonged use in the field without any special maintenance, other than routine battery replacement. However, the equipment is not totally sealed and appropriate precautions should be taken. Remember, it is a precision electronic instrument and should be treated as such. **There are no internal user controls.**

The equipment should only be operated by qualified personnel.

Some organic materials may attack plastic parts and cause early degradation. Contact with such materials should be avoided.

DO NOT operate damaged equipment.

The Warranty will be voided if the base unit (P/N 5VNUI-0014) has been disassembled for any purpose other than to replace the 9V battery. It is not necessary to access any component inside the unit. Return the unit for repair

SERVICE REPAIRS AND MAINTENANCE

Repairs not covered by the warranty or carried out after the warranty period, will be charged at the current hourly or set service rate, plus the cost of materials.

Goods for repair must be sent at the Purchaser's expense, and be accompanied by the Purchaser's written order (purchase order) describing the defect and authorizing McGan to invoice the purchaser for labour, materials and return delivery cost.

No service or repair will be undertaken until a written order is received.

BEFORE YOU CALL FOR SERVICE

Read the section on "troubleshooting" in this handbook and check the symptom, cause and solution before you call for service.

Service Phone # 508-876-1070

12.0 MM-5kV Part Numbers

Part Number	Description
5VKIT-0012	Kit containing base unit, Ground wire, brush and ring electrode, 9v battery, Manuals, Training CD and carrying case
5VBAT-0013	9V battery
5VUNI-0014	Base unit
5VACP-0015 (optional)	AC-DC Adaptor used to charge battery pack
5VEBP-0016 (optional)	Rechargeable external battery pack
MMBRU-0007	8mm Brush electrode
MMRIN-0009	Ring Electrode
MMGWC-0005	Ground wire (green) with alligator clip
MMRWP-0006 (optional)	HV lead (red) with mini-handle
MMTRI-0022A (optional)	Tri-Hole Electrode

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OFFERING

Strong technical support

We provide strong technical support and a quick response to inquiries and orders.

Market and product knowledge

We understand technical specifications demanded by industry and recognize customer requirements are specific in relation to testing and measuring instruments.

Warranties and after sales service

McGan provides a 12 month warranty for its Micromed MM-5kV base unit (p/n 5VUNI-0014) with detailed operating instruction handbook as well as after sales support and service.