IMG-100 Inverted Magnetron Gauge

INSTRUCTION MANUAL

Manual No. 699908220
Revision B
May 2004
IMG-100 Inverted Magnetron Gauge
Warranty

Products manufactured by Seller are warranted against defects in materials and workmanship for twelve (12) months from date of shipment thereof to Customer, and Seller’s liability under valid warranty claims is limited, at the option of Seller, to repair, replace, or refund an equitable portion of the purchase price of the Product. Items expendable in normal use are not covered by this warranty. All warranty replacement or repair of parts shall be limited to equipment malfunctions which, in the sole opinion of Seller, are due or traceable to defects in original materials or workmanship. All obligations of Seller under this warranty shall cease in the event of abuse, accident, alteration, misuse, or neglect of the equipment. In-warranty repaired or replaced parts are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced parts. After expiration of the applicable warranty period, Customer shall be charged at the then current prices for parts, labor, and transportation.

Reasonable care must be used to avoid hazards. Seller expressly disclaims responsibility for loss or damage caused by use of its Products other than in accordance with proper operating procedures. Except as stated herein, Seller makes no warranty, express or implied (either in fact or by operation of law), statutory or otherwise; and, except as stated herein, Seller shall have no liability under any warranty, express or implied (either in fact or by operation of law), statutory or otherwise. Statements made by any person, including representatives of Seller, which are inconsistent or in conflict with the terms of this warranty shall not be binding upon Seller unless reduced to writing and approved by an officer of Seller.

Warranty Replacement and Adjustment

All claims under warranty must be made promptly after occurrence of circumstances giving rise thereto, and must be received within the applicable warranty period by Seller or its authorized representative. Such claims should include the Product serial number, the date of shipment, and a full description of the circumstances giving rise to the claim. Before any Products are returned for repair and/or adjustment, written authorization from Seller or its authorized representative for the return and instructions as to how and where these Products should be returned must be obtained. Any Product returned to Seller for examination shall be prepaid via the means of transportation indicated as acceptable by Seller. Seller reserves the right to reject any warranty claim not promptly reported and any warranty claim on any item that has been altered or has been returned by non-acceptable means of transportation. When any Product is returned for examination and inspection, or for any other reason, Customer shall be responsible for all damage resulting from improper packing or handling, and for loss in transit, notwithstanding any defect or non-conformity in the Product. In all cases, Seller has the sole responsibility for determining the cause and nature of failure, and Seller’s determination with regard thereto shall be final.

If it is found that Seller’s Product has been returned without cause and is still serviceable, Customer will be notified and the Product returned at Customer’s expense; in addition, a charge for testing and examination may be made on Products so returned.

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We declare under our sole responsibility that the product, to which this declaration relates is in conformity with the following standard(s) or other normative documents.

**IMG-100 Inverted Magnetron Gauge**

EN 55011
1991 .......................... Group 1 Class A ISM emission requirements

EN 61010-1
1993 .......................... Safety requirements for electrical equipment for measurement, control, and laboratory use incorporating Amendments Nos 1 and 2.

EN 50082-2
1995 .......................... EMC heavy industrial generic immunity standard

Frederick C. Campbell
Operations Manager
Vacuum Technologies
Varian, Inc.
Lexington, Massachusetts, USA

October 2003
Preface

Hazard and Safety Information

This product must only be operated and maintained by trained personnel.

This manual uses the following standard safety protocols:

**WARNING**

Warnings indicate a particular procedure or practice, which if not followed correctly, could lead to serious injury.

**CAUTION**

Cautions indicate a particular procedure or practice, which if not followed, could cause damage to the equipment.

**NOTE**

Notes contain important information.

Before operating or servicing equipment, read and thoroughly understand all operation/maintenance manuals provided by Vacuum Technologies. Be aware of the hazards associated with this equipment, know how to recognize potentially hazardous conditions, and how to avoid them. Read carefully and strictly observe all cautions and warnings. The consequences of unskilled, improper, or careless operation of the equipment can be serious.

In addition, consult local, state, and national agencies regarding specific requirements and regulations. Address any safety, operation, and/or maintenance questions to your nearest Vacuum Technologies office.
Grounding the IMG-100 Inverted Magnetron Gauge Controller

Be certain that the IMG-100 Inverted Magnetron Gauge Controller and vacuum system are separately grounded to a common ground.

**WARNING**
- Do not place a ground wire between the vacuum chamber and the controller chassis; large continuous currents could flow through it.
- Personnel can be killed by high voltages (160 to 900 V may be present in an improperly grounded system).
- Make absolutely sure that the vacuum system is grounded as shown in Figure 1.
- Test the system ground to be sure that it is complete and capable of supporting at least 10 A.

**Figure 1  Ion Gauge and Vacuum System Connections**

Use with Combustibles and Mixtures

**WARNING**

As with all ionization gauges, this device is not intrinsically safe. Exercise extreme care when using this vacuum gauge while pumping or backfilling a system or in any other system condition which contains combustible gases or mixtures. The filament, the end of a hot filament ion gauge and the high voltage discharge of a cold cathode gauge can be ignition sources.

When such a gas or mixture is present, do not turn on any such vacuum gauge. Failure to follow this instruction could result in serious injury to personnel and damage to equipment.
Vacuum Equipment and Cleanliness

Cleanliness is vital when servicing any vacuum equipment.

**CAUTION**

Do not use silicone oil or silicone grease.

Use powder-free butyl or polycarbonate gloves to prevent skin oils from getting on vacuum surfaces.

Do not clean any aluminum parts with Alconox. Alconox is not compatible with aluminum and will cause damage.

**NOTE**

Normally, it is unnecessary to use vacuum grease. However, if it must be used, do not use silicone types, and use it sparingly. Apiezon L grease is recommended (Vacuum Technologies Part Number 695400004).
EMC Warnings

EN 55022 Class A Warning

This is a Class A product. In a domestic environment this product may cause radio interference. In such cases, the user will be required to correct the interference at his own expense.

FCC

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation.

NOTE

The equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is also likely to cause harmful radio communications interference in which case, the user will be required to correct the interference at his own expense.

Contacting Vacuum Technologies

In the United States, you can contact Vacuum Technologies Customer Service at 1-800-8VARIAN.

Internet users:

- Send email to Customer Service & Technical Support at vpl.customer.support@varianinc.com
- Visit our web site at www.varianinc.com/vacuum
- Order on line at www.evarian.com

See the back cover of this manual for a listing of our sales and service offices.
IMG-100 General Purpose Inverted Magnetron Gauge

Description

The IMG-100 is a 1" diameter inverted magnetron cold cathode ionization gauge that measures vacuum pressure from 1 mT to 5 x 10^{-9} T.

Advantages include:

- An inverted magnetron design that ensures fast, reliable starting and good linearity throughout the pressure range as compared to traditional cold cathode/magnetron type gauges.
- Minimized outgassing at high vacuum due to temperature increases because there is no hot filament.
- Greater ruggedness with the IMG-100 than Bayard-Alpert type gauges because there is no delicate filament to break or burnout due to high-pressure exposure.
- An all-welded stainless steel shell that is virtually unbreakable compared to that of typical glass Bayard-Alpert gauges.
- A lack of excess electrons, photons, and heat which can be important in some applications.

A standard SHV connector and coaxial cable provides for a safe, easy connection to a Multi-Gauge. Attachment to the vacuum system is made using either a KF or ConFlat flange. All materials exposed to the vacuum system are high vacuum compatible with no elastomers used in IMG-100 construction.

Application

Use the IMG-100 wherever an extremely rugged high vacuum gauge is desired or where the presence of stray electrons and photons can cause problems in the vacuum system. While the inverted magnetron design ensures good linearity as compared to a standard cold cathode type gauge, the IMG-100, like other cold cathode type gauges, is generally not as stable and linear as a well-maintained Bayard-Alpert type.

The IMG-100 with CFF handles bakeout temperatures of up to 150 °C, with the cable unplugged. The temperature limit of the KF versions depends on the O-ring material and the clamp used.

Due to the IMG-100 start time, no specific starting accessory is required under normal conditions. However, very cold temperatures and contamination build-up can result in extended starting times, especially at high vacuum.
As with all cold cathode devices, the magnet generates a field external to the device. When installing the IMG-100, follow these guidelines (Figure 1-1):

- Do not mount the IMG-100 closer than a few inches to any magnetic material.
- If no magnetic force from the IMG-100 can be felt, it is sufficiently far away.
- Exercise care in mounting and handling to prevent the gauge from contacting other objects.
- Avoid rough handling or prolonged contact with the metal surface which can cause a decrease in magnet strength and result in a calibration change.

![Figure 1-1 Outline Drawing, IMG-100 Inverted Magnetron Gauge](image-url)

The calibration of the IMG-100 may be maintained under the STARRS service program. STARRS allows simple, periodic service and calibration for all of your Vacuum Technologies gauging equipment. Contact Vacuum Technologies Customer Service at 1-800-8VARIAN for more information on the STARRS program.
Technical Specifications

Table 1-1 lists the gauge technical specifications.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage (HV range)</td>
<td>3 kv</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>2 A/Torr nominal ± 20% @ 5 x 10^−6 T</td>
</tr>
<tr>
<td>Measurement Range</td>
<td>1 mT to 5 x 10^−9 Torr</td>
</tr>
<tr>
<td>Maximum Operating Temperature</td>
<td>150 °C, no cable, CFF metal gasket</td>
</tr>
<tr>
<td>Electrical Connector</td>
<td>SHV style, 5kV rated</td>
</tr>
<tr>
<td>Feedthrough/HV Seal</td>
<td>Glass compression seal</td>
</tr>
<tr>
<td>Ignition Time</td>
<td>&lt; 5 seconds at pressures &lt;1E-6 Torr</td>
</tr>
<tr>
<td>Material Exposed to the Vacuum</td>
<td>Stainless steel, Nickel alloy 52 and glass</td>
</tr>
</tbody>
</table>

Ordering Information

Table 1-2 lists the part numbers for the IMG-100.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R0310301</td>
<td>IMG-100 NW-25</td>
</tr>
<tr>
<td>R0310302</td>
<td>IMG-100 NW-40</td>
</tr>
<tr>
<td>R0310303</td>
<td>IMG-100 2.75 CFF</td>
</tr>
<tr>
<td>R03113xxx</td>
<td>Cable, xxx is the length in feet</td>
</tr>
</tbody>
</table>
Fringe Field Contours

Figure 1-2 and Figure 1-3 represent fringe field contours.
Figure 1-3  Fringe Field Contour
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Request for Return
Health and Safety Certification

1. Return authorization numbers (RA#) will not be issued for any product until this Certificate is completed and returned to a Varian, Inc. Customer Service Representative.

2. Pack goods appropriately and drain all oil from rotary vane and diffusion pumps (for exchanges please use the packing material from the replacement unit), making sure shipment documentation and package label clearly shows assigned Return Authorization Number (RA#) VVT cannot accept any return without such reference.

3. Return product(s) to the nearest location:

North and South America
Varian, Inc.
Vacuum Technologies
121 Hartwell Ave.
Lexington, MA 02421
Fax: (781) 860-9252

Europe and Middle East
Varian S.p.A.
Via F.lli Varian, 54
10040 Leini (TO) – ITALY
Fax: (39) 011 997 9350

Asia and ROW
Varian Vacuum Technologies
Local Office

For a complete list of phone/fax numbers see www.varianinc.com/vacuum

4. If a product is received at Varian, Inc. in a contaminated condition, the customer is held responsible for all costs incurred to ensure the safe handling of the product, and is liable for any harm or injury to Varian, Inc. employees occurring as a result of exposure to toxic or hazardous materials present in the product.

CUSTOMER INFORMATION

Company name: .................................................................
Contact person: Name: ........................................................
Fax: ................................................................. E-mail: .................................................................
Ship method: Shipping Collect #: ........................................ P.O.#: .................................................................
Europe only: VAT Reg Number: .......... USA only: ☐ Taxable ☐ Non-taxable
Customer ship to: ................................................................. Customer bill to: .................................................................

PRODUCT IDENTIFICATION

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Varian, Inc. Part Number</th>
<th>Varian, Inc. Serial Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TYPE OF RETURN (check appropriate box)

☐ Paid Exchange ☐ Paid Repair ☐ Warranty Exchange ☐ Warranty Repair ☐ Loaner Return
☐ Credit ☐ Shipping Error ☐ Evaluation Return ☐ Calibration ☐ Other

HEALTH and SAFETY CERTIFICATION

Vacuum Technologies cannot accept any biological hazards, radioactive material, organic metals, or mercury at its facility. Check one of the following:

☐ I confirm that the above product(s) has (have) NOT pumped or been exposed to any toxic or dangerous materials in a quantity harmful for human contact.

☐ I declare that the above product(s) has (have) pumped or been exposed to the following toxic or dangerous materials in a quantity harmful for human contact (Must be filled in):

Print Name: ................................................................. Signature: ................................................................. Date: .................................................................

PLEASE FILL IN THE FAILURE REPORT SECTION ON THE NEXT PAGE

Do not write below this line
Notification (RA) #: ........................................... Customer ID #: ................................................................. Equipment #: .................................................................
## Request for Return

### Health and Safety Certification

**Failure Report**
(Please describe in detail the nature of the malfunction to assist us in performing failure analysis):

### Turbo Pumps and Turbocontrollers

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Position</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Does not start</td>
<td>❑ Noise</td>
<td>❑ Vertical</td>
</tr>
<tr>
<td>❑ Does not spin freely</td>
<td>❑ Vibrations</td>
<td>❑ Horizontal</td>
</tr>
<tr>
<td>❑ Does not reach full speed</td>
<td>❑ Leak</td>
<td>❑ Upside-down</td>
</tr>
<tr>
<td>❑ Mechanical Contact</td>
<td>❑ Overtemperature</td>
<td>❑ Other</td>
</tr>
<tr>
<td>❑ Cooling defective</td>
<td>❑ Clogging</td>
<td></td>
</tr>
</tbody>
</table>

**Describe Failure:**

**Turbocontroller Error Message:**

### Ion Pumps/Controllers

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Bad feedthrough</td>
<td>❑ Poor vacuum</td>
</tr>
<tr>
<td>❑ Vacuum leak</td>
<td>❑ High voltage problem</td>
</tr>
<tr>
<td>❑ Error code on display</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**

### Valves/Components

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Main seal leak</td>
<td>❑ Bellows leak</td>
</tr>
<tr>
<td>❑ Solenoid failure</td>
<td>❑ Damaged flange</td>
</tr>
<tr>
<td>❑ Damaged sealing area</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**

### Leak Detectors

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Cannot calibrate</td>
<td>❑ No zero/high background</td>
</tr>
<tr>
<td>❑ Vacuum system unstable</td>
<td>❑ Cannot reach test mode</td>
</tr>
<tr>
<td>❑ Failed to start</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**

### Instruments

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Gauge tube not working</td>
<td>❑ Display problem</td>
</tr>
<tr>
<td>❑ Communication failure</td>
<td>❑ Degas not working</td>
</tr>
<tr>
<td>❑ Error code on display</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**

### All Other Varian, Inc.

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Pump doesn’t start</td>
<td>❑ Noisy pump (describe)</td>
</tr>
<tr>
<td>❑ Doesn’t reach vacuum</td>
<td>❑ Overtemperature</td>
</tr>
<tr>
<td>❑ Pump seized</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**

### Diffusion Pumps

<table>
<thead>
<tr>
<th>Claimed Defect</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>❑ Heater failure</td>
<td>❑ Electrical problem</td>
</tr>
<tr>
<td>❑ Doesn’t reach vacuum</td>
<td>❑ Cooling coil damage</td>
</tr>
<tr>
<td>❑ Vacuum leak</td>
<td>❑ Other</td>
</tr>
</tbody>
</table>

**Describe failure:**

**Customer application:**
Sales and Service Offices

Argentina
Varian Argentina Ltd.
Sucursal Argentina
Av. Ricardo Balbin 2316
1428 Buenos Aires
Argentina
Tel: (54) 1 783 5306
Fax:(54) 1 786 5172

Benelux
Varian Vacuum Technologies
Rijkstraatweg 269 H,
3956 CP Leersum
The Netherlands
Tel: (31) 343 469910
Fax:(31) 343 469961

Brazil
Varian Industria e Comercio Ltda.
Avenida Dr. Cardoso de Mello 1644
Vila Olimpia
Sao Paulo 04548 005
Brazil
Tel: (55) 11 3845 0444
Fax:(55) 11 3845 9350

Canada
Central coordination through:
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax:(781) 860 5437
Toll Free: (800) 882 7426

China
Varian Technologies - Beijing
Room 1201, Jinyu Mansion
No. 129A, Xuanwumen Xidajie
Xicheng District
Beijing 100031 P.R. China
Tel: (86) 10 6641 1530
Fax:(86) 10 6641 1534

France and Wallonie
Varian s.a.
7 avenue des Tropiques
Z.A. de Courtaboeuf – B.P. 12
Les Ulis cedex (Orsay) 91941
France
Tel: (33) 1 69 86 38 13
Fax:(33) 1 69 28 23 08

Germany and Austria
Varian Deutschland GmbH
Alsfelder Strasse 6
Postfach 11 14 35
64289 Darmstadt
Germany
Tel: (49) 6151 703 353
Fax:(49) 6151 703 302

India
Varian India PVT LTD
101-108, 1st Floor
1010 Competent House
7, Nangal Raya Business Centre
New Delhi 110 046
India
Tel: (91) 11 5548444
Fax:(91) 11 5548445

Italy
Varian Vacuum Technologies
Via F.III Varian, 54
10040 Leini, (Torino)
Italy
Tel (39) 011 997 9 111
Fax (39) 011 997 9 350

Japan
Varian Vacuum Technologies
Sumitomo Shibaura Building, 8th Floor
4-16-36 Shibaura
Minato-ku, Tokyo 108
Japan
Tel: (81) 3 5232 1253
Fax:(81) 3 5232 1263

Korea
Varian Technologies Korea, Ltd.
Shinsa 2nd Building 2F
966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel: (82) 2 3452 2452
Fax:(82) 2 3452 2451

Mexico
Varian S.A.
Concepcion Beistegui No 109
Col Del Valle
C.P. 03100
Mexico, D.F.
Tel: (52) 5 523 9465
Fax:(52) 5 523 9472

Taiwan
Varian Technologies Asia Ltd.
14F-16 No.77, Hsin Tai Wu Road Sec. 1,
Hsi Chih, Taipei Hsien
Taiwan, R.O.C.
Tel: (886) 2 2698 9555
Fax:(886) 2 2698 9678

UK and Ireland
Varian Ltd.
28 Manor Road
Walton-On-Thames
Surrey KT 12 2OQ
England
Tel: (44) 1932 89 8000
Fax:(44) 1932 22 8769

United States
Varian Vacuum Technologies
121 Hartwell Avenue
Lexington, MA 02421
USA
Tel: (781) 861 7200
Fax:(781) 860 5437

Other Countries
Varian Vacuum Technologies
Via F.III Varian, 54
10040 Leini, (Torino)
Italy
Tel: (39) 011 997 9 111
Fax:(39) 011 997 9 350

Customer Support and Service:

North America
Tel: 1 (800) 882-7426 (toll-free)
vtl.technical.support@varianinc.com

Europe
Tel: 00 (800) 234 234 00 (toll-free)
vtl.technical.support@varianinc.com

Japan
Tel: (81) 3 5232 1253 (dedicated line)
vtj.technical.support@varianinc.com

Korea
Tel (82) 2 3452 2452 (dedicated line)
vtk.technical.support@varianinc.com

Taiwan
Tel: 0 (800) 051 342 (toll-free)
vtw.technical.support@varianinc.com

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