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# ***IMG-300 Inverted Magnetron Gauge***

*INSTRUCTION MANUAL*

Manual No. 699908230

Revision A

March 2009

# IMG-300 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.

3/1/00

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Declaration of Conformity  
Konformitätserklärung  
Déclaration de Conformité  
Declaración de Conformidad  
Verklaring de Overeenstemming  
Dichiarazione di Conformità



We  
Wir  
Nous  
Nosotros  
Wij  
Noi

Varian, Inc.  
Vacuum Technologies  
121 Hartwell Avenue  
Lexington, MA, 02421-3133 USA

declare under our sole responsibility that the product,  
erklären, in alleniniger Verantwortung, daß dieses Produkt,  
déclarons sous notre seule responsabilité que le produit,  
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verklaren onder onze verantwoordelijkheid, dat het product,  
dichiariamo sotto nostra unica responsabilità, che il prodotto,

**IMG-300 Inverted Magnetron Gauge**

to which this declaration relates is in conformity with the following standard(s) or other normative documents.  
auf das sich diese Erklärung bezieht, mit der/den flogenden Norm(en) oder Richtlinie(n) übereinstimmt.  
auquel se réfère cette déclaration est conforme à la (auz) norme(s) ou au(x) document(s) normatif(s).  
al que se refiere esta declaración es conforme a la(s) norma(s) u otro(s) documento(s) normativo(s).  
waamaar deze verklaring verwijst, aan de volende norm(en) of richtlijn(en) beantwoordt.  
a cui se riferisce questa dichiarazione è conforme alla/e sequente/I norma/o documento/I normativo/i.

- 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

A handwritten signature in black ink that reads "Frederick C. Campbell".

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 Varian. 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 Varian office.



# IMG-300 Inverted Magnetron Gauge

## Grounding the IMG-300 Inverted Magnetron Gauge Controller

Be certain that the IMG-300 Inverted Magnetron Gauge Controller and vacuum system are separately connected 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 (3 kV 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.

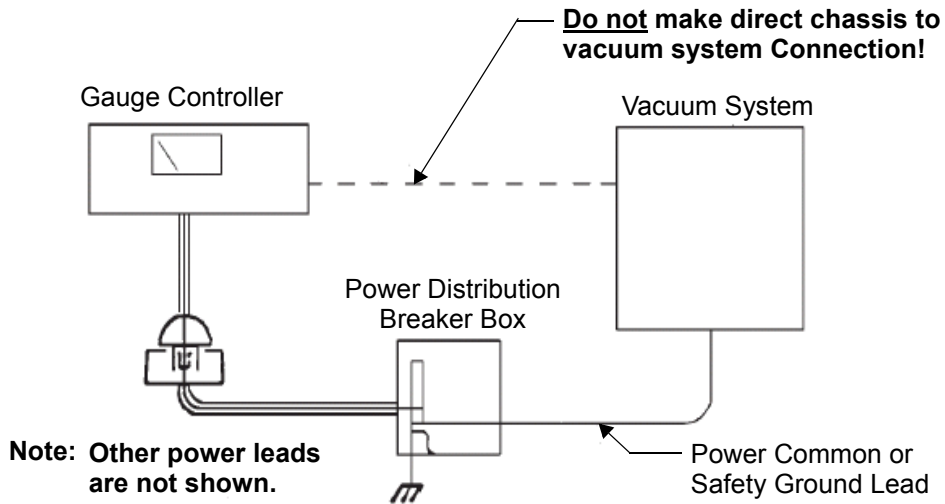


Figure 1 Ion Gauge and Vacuum System Connections

## 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 grid 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, never turn on any such vacuum gauge and disconnect it from the controller. Failure to follow this instruction could result in serious injury to personnel and damage to equipment.

## IMG-300 Inverted Magnetron Gauge

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### 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 (Varian 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.



*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 Varian

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

Internet users:

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

See the back cover of this manual for a listing of our sales and service offices.

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# IMG-300 General Purpose Inverted Magnetron Gauge

## Description

The IMG-300 is a 1.6" diameter inverted magnetron cold cathode ionization gauge that measures vacuum pressure from  $10^{-3}$  Torr ( $10^{-3}$  mbar) down to  $10^{-11}$  Torr ( $10^{-11}$  mbar).

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-300 than Bayard-Alpert type gauges because there is no delicate grid assembly and 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.
- ❑ Extremely rapid response.

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 a ConFlat flange. All materials exposed to the vacuum system are high vacuum compatible. No elastomers are used in IMG-300 construction.

## Application

Use the IMG-300 wherever an extremely rugged, fast response UHV 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-300, like other cold cathode type gauges, is generally not as stable and linear as a well-maintained Bayard-Alpert type.

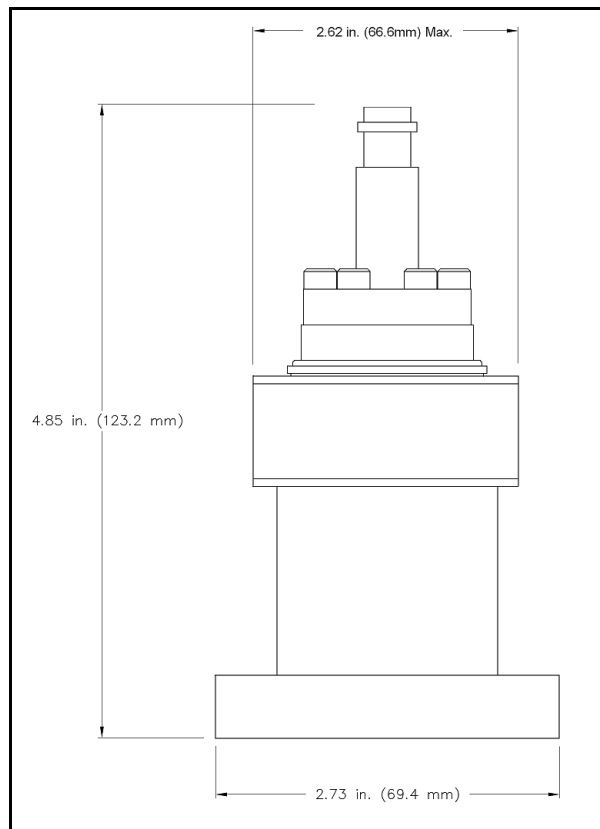
The IMG-300 with CFF handles bakeout temperatures of up to 250 °C, with the cable unplugged.

## IMG-300 Inverted Magnetron Gauge

Due to the IMG-300 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-300, follow these guidelines (Figure 1-1):

- ❑ Do not mount the IMG-300 closer than a few inches to any magnetic material.
- ❑ If no magnetic force from the IMG-300 can be felt, it is sufficiently far away.
- ❑ Exercise care in mounting and handling to prevent the gauge from contacting other objects, especially steel hand tools as these are strongly attracted by the magnet.
- ❑ 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-300 Inverted Magnetron Gauge**

The calibration of the IMG-300 may be maintained under the STARRS service program. STARRS allows simple, periodic service and calibration for all of your Vacuum Technologies gauging equipment. Contact Varian Customer Service at 1-800-8VARIAN for more information on the STARRS program.

## Technical Specifications

Table 1-1 lists the gauge technical specifications.

**Table 1-1 IMG-300 Technical Specifications**

Specification	Definition
Operating voltage (HV range)	3 kV DC
Sensitivity	2.5 A/Torr + 100%; -5% @ $5 \times 10^{-6}$ Torr
Measurement Range	$10^{-3}$ to $10^{-11}$ Torr
Maximum Operating Temperature	250 °C, CFF metal gasket; with magnet
Electrical Connector	SHV style, 5kV rated
Feedthrough/UHV	Ceramic brazed
Ignition Time	< 5 seconds at pressures > $1 \text{E}^{-6}$ Torr, typically 20 min @ $1 \text{E}^{-10}$ Torr
Response Time	< 10 milliseconds for increasing pressure
Material Exposed to the Vacuum	304L Stainless steel, Nickel, 2% Thoriated Tungsten, and ceramic

## Ordering Information

Table 1-2 lists the part numbers for the IMG-300.

**Table 1-2 IMG-300 Parts**

Part Number	Description
R0343301	IMG-300 2.75 CFF
R0040301	Maintenance kit

## Fringe Field Contours

Figure 1-2 and Figure 1-3 represent fringe field contours.

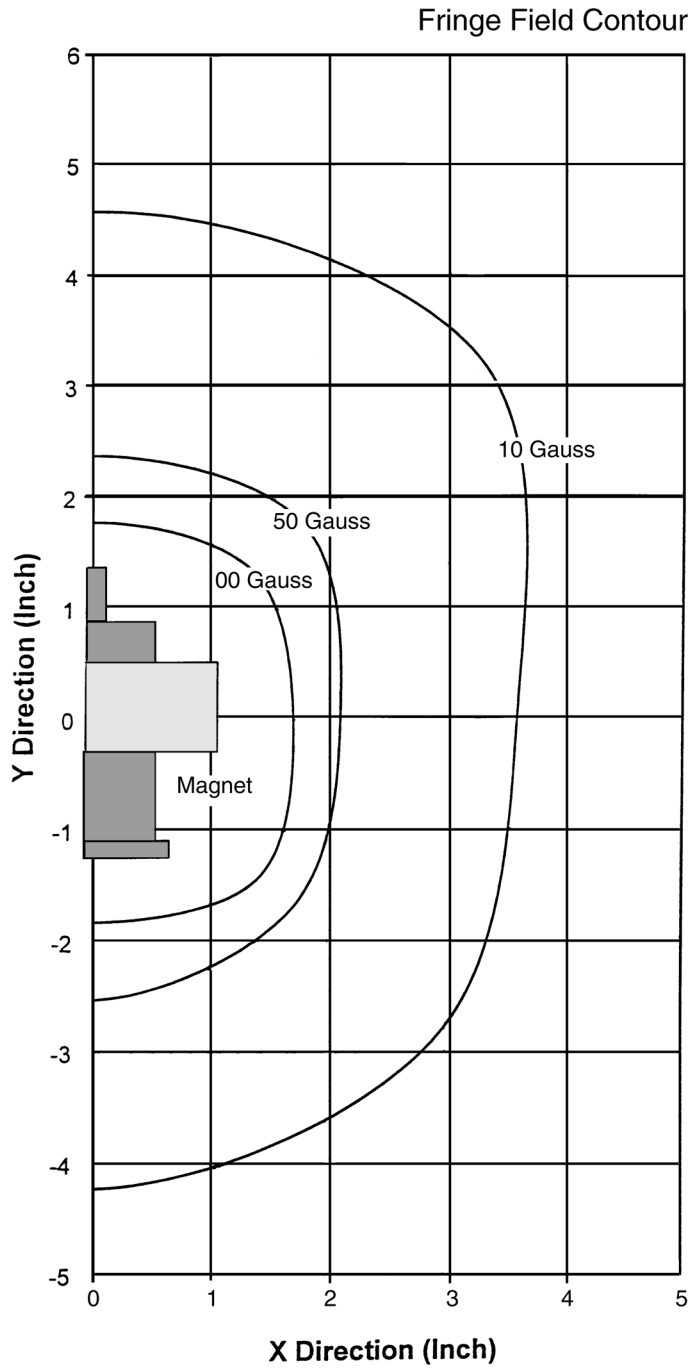
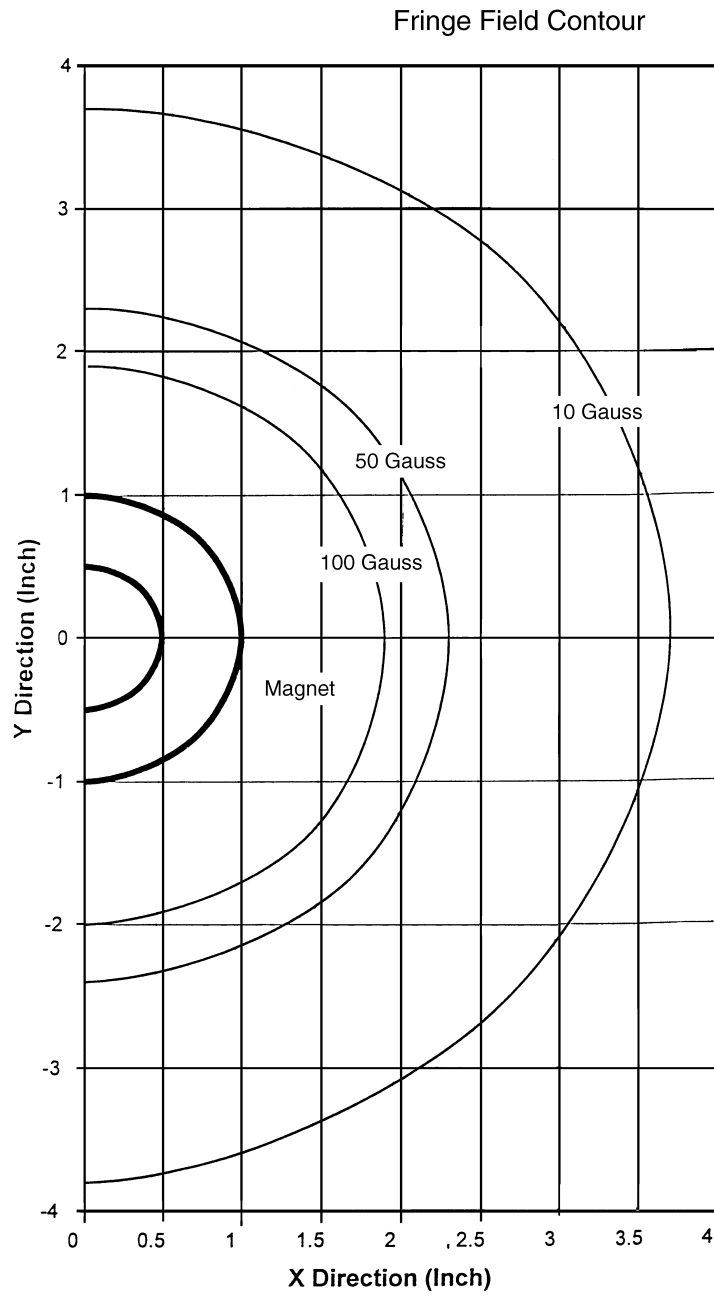


Figure 1-2 Fringe Field Contour



# IMG-300 Inverted Magnetron Gauge



**Figure 1-3 Fringe Field Contour**

## IMG-300 Inverted Magnetron Gauge

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## IMPORTANT Instructions for returning products

Dear Customer,

Please follow these instructions whenever one of our products needs to be returned:

1. Complete the *Request for Return* form on our website ([www.varianinc.com](http://www.varianinc.com)) and send it to Varian (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.
2. After evaluating the information, Varian will provide you with a Return Authorization (RA) number via email or fax, as requested.

**Note:** Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, e.g.).

3. **Important steps for the shipment of returning product:**
  - Remove all accessories from the core product (e.g. inlet screens, vent valves).
  - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
  - If ordering an Advance Exchange product, **use the packaging from the Advance Exchange to return the defective product.**
  - Seal the product in a plastic bag, and package the product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
  - Varian, Inc. is not responsible for returning customer provided packaging or containers.
  - Clearly label package with the RA number.** Using the shipping label provided ensures the proper address and RA number are on the package. Packages shipped to Varian without an RA clearly written on the outside cannot be accepted and will be returned.
4. Return only products for which the RA was issued.
5. **Product being returned under an RA must be received within 15 business days.**
6. **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.
7. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.

Return the completed request for return form to your nearest location:

**North America:**

FAX: 1-781-860-9252  
Toll Free: 800-8VARIAN  
(800-882-7426)

[vtl.ra@varianinc.com](mailto:vtl.ra@varianinc.com)

**Europe:**

FAX: 00 39-011-9979125  
Fax Free: 00 800 345 345 00  
Toll Free: 00 800 234 234 00

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**Pacific Rim:**

Please visit our website for individual office information.

<http://www.varianinc.com/vacuum>

## IMG-300 Inverted Magnetron Gauge

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Italy  
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vtl.technical.support@varianinc.com

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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

### Worldwide Web Site, Catalog and On-line Orders:

www.varianinc.com

Representatives in most countries



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