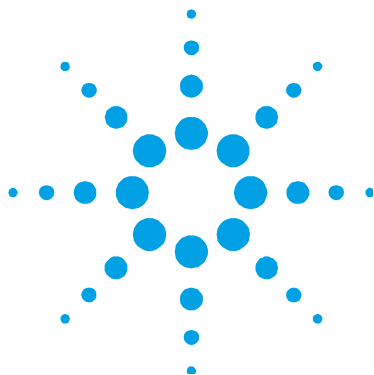




TITANIUM SUBLIMATION CARTRIDGE

Models

916-0050

716-0050

User Manual

87-900-097-01(E)

05/2011



Agilent Technologies

Notices

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Agilent Technologies Italia S.p.A.

Vacuum Products Division

Via F.Ili Varian, 54

10040 Leini (TO)

ITALY

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

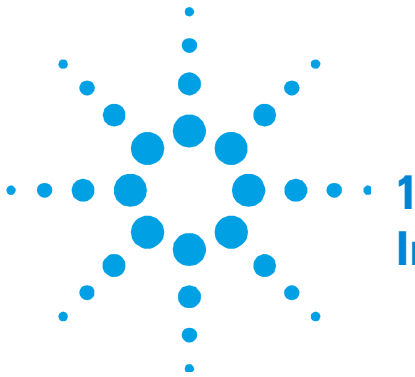
Titanium Sublimation Cartridge



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Original Instructions



Safety Summary

This instruction manual includes information required to enable qualified personnel to safely and reliably perform those functions for which the product was designed.

Should the product fail to operate, the operator must call upon qualified maintenance personnel to troubleshoot and repair.

Throughout this manual you will find the words: WARNING CAUTION NOTE which has the following meaning.

WARNING!



Warnings are used when failure to observe instructions or precautions could result in injury or death to humans.

CAUTION!

Cautions are used when failure to observe instructions could result in permanent damage to equipment (Agilent supplied and/or other associated equipment).

NOTE

Information to help you obtaining best performance from your instrument.

Safety Precautions

WARNING!



Before connecting the cable from the controller, the Titanium Sublimation Cartridge must be inserted into the vacuum system.

Description

General

The titanium sublimation cartridge model 916-0050 (fig. 1) / 716-0050 provides a titanium source for titanium sublimation pumping in both high vacuum and baked ultra high vacuum systems.

The cartridge holds three filaments and offers an economical means of pumping chemically active (getterable) gases at high speeds.

The titanium sublimation cartridge can be used with other pumps which remove non-getterable gases

NOTE

The short TSP (p/n 716-0050) is for application with restricted space. It should not be used in the Cryopanel (p/n 9190180).

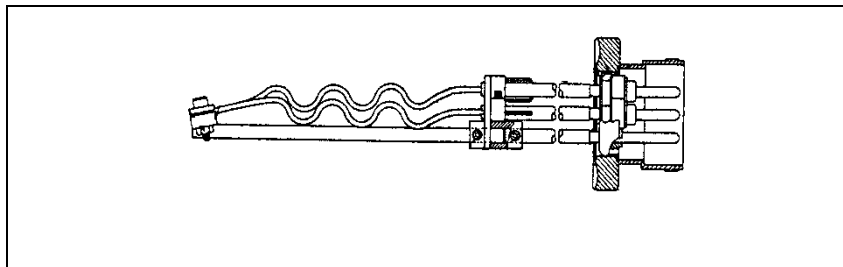


Figure 1 Titanium Sublimation Cartridge

The filaments are made of a titanium-molybdenum alloy and are constructed to prevent burnout. They are held in place by gold plated set screws which allow easy filament removal and replacement.

The titanium sublimation cartridge mates with any 2 3/4" O.D. (NW35) ConFlat® flange.

Product Specification

Tab. 1

Part number:	916-0050 / 716-0050
Description:	TSP Filament Cartridge on 2 ¾ CFF
Short description:	TSP Cartridge 2 ¾ CFF

Tab. 2 Filament specification

Material:	85Ti-15Mo
Length:	152.4 mm
Diam:	1.99 mm
Total Titanium:	2.7 gr
Dispensable Titanium:	1.1 gr
Maximum operating current:	50 A
Maximum power:	225 Watts
Operating voltage:	4.5 V at holder
Life:	12 hr at 50 A
Sublimation rate:	0.09 to 0.1 gr/hr
Weight:	0.6 kg
Part number:	916-0051
Description:	TSP Filament, pkg of 12
Short description:	TSP Filament, pkg of 12

Tab. 3 Holder

Vacuum flange	2 ¾" O.D. (NW35) ConFlat
Bakeability	250 °C for normal operation 450 °C with reduced life caused by oxidation of brazed joints and increased thermal shock.

Outline Drawing

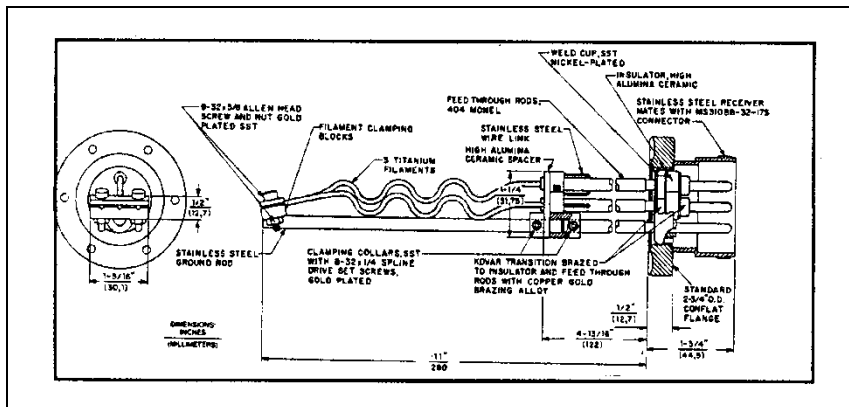


Figure 2 Outline Drawing of Titanium Sublimation Cartridge 916-0050

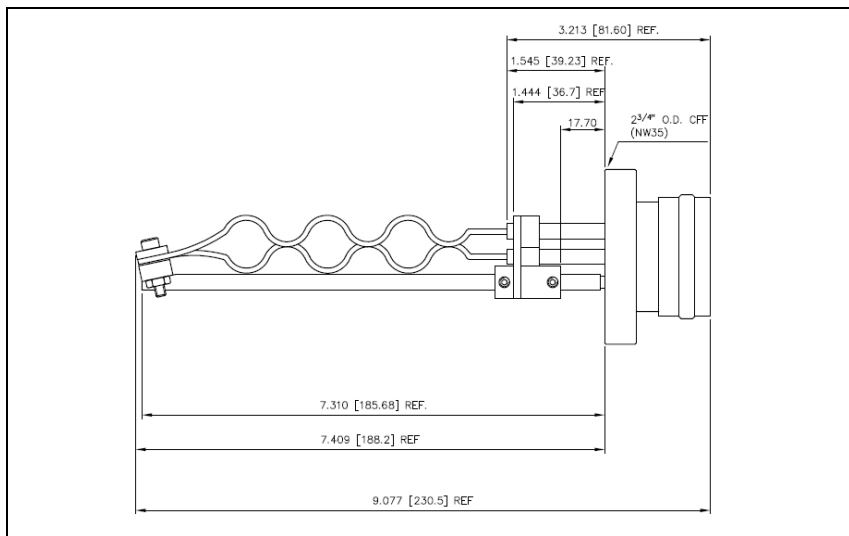


Figure 3 Drawing of short Titanium Sublimation Cartridge 716-0050

Installation

Vacuum Connection

Insert the cartridge in a vacuum chamber and secure it in place by the ConFlat flange with a new copper gasket between the two flanges.

To prevent galling apply high temperature lubricant (such as Fel-PRO C-100) to screw threads and between nuts and flange. Uniformly tighten screw and nut set until the flange faces meet.

Control Unit Connection

Connect the output cable of the control unit to the filament cartridge. Consult the control unit instruction manual for detailed information.

Operating Instructions

General

For a detailed explanation of the sequential use and operation please refer to the instruction manual of the control unit used.

The theory of titanium sublimation pumping is also covered in each control unit instruction manual.

Filament Outgassing

Rough pump the system to a pressure below 10^{-2} Torr/mbar range and outgas each new filament in turn at a current of 37 to 42 A for at least 1 minute.

This outgassing procedure will reduce the burst of gas released from a new filament when power is applied for pumping at low pressure.

Bakeout

To support the bakeout process the filament can be heated with a reduced current below the sublimation limit. A current of ~ 25 A has shown good results in practice.

CAUTION!

Take care not exceeding the maximum allowed temperature of you cable & connector during bakeout

Normal Operation

Adjust the current level to the desired setting and in accordance with the titanium sublimation rate (see fig. 4).

The amount of current determines the temperature of the filament and in turn the rate at which titanium is sublimed. For normal TSP-filament operation, the current should be maintained at the desired current level throughout the life of the filament. A desirable current level would be 46 to 48 A.

CAUTION!

Using 716-0050 with cable 924-0730 do not exceed flash times of 5 minutes to stay below the maximum temperature of the cable.

End of Filament Life

Filaments do not necessarily burn out at end of life. Therefore, other means may be used to determine when the usable titanium has been consumed.

End of filament life can be recognised when:

- Desired current cannot be maintained even at maximum voltage/current setting.
- There is no improvement in pressure after power has been applied to a filament.
- Change in resistance – open circuit (no current reading).

1 Instructions for Use

Operating Instructions

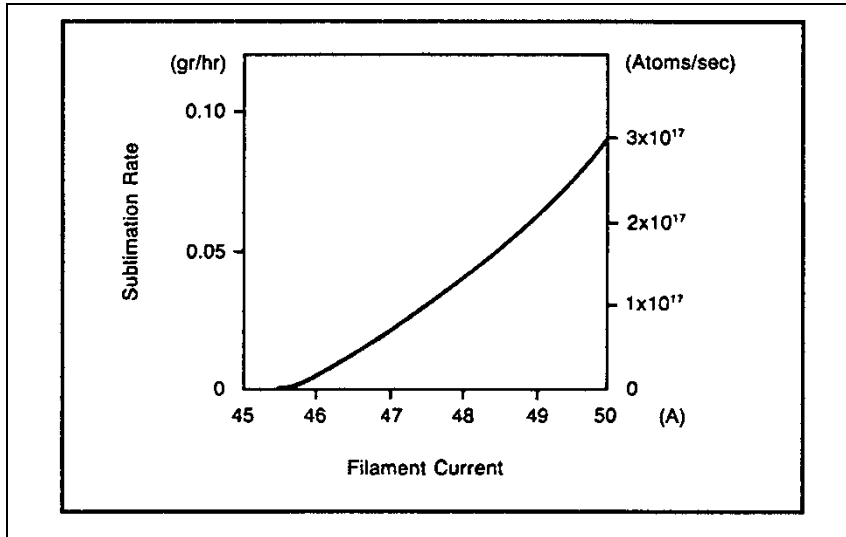


Figure 4 Typical Titanium Sublimation Rate Versus Filament Current

Maintenance

Filament Replacement

- Vent the system using dry nitrogen and maintain a slight positive pressure during the replacement procedure.
- Remove the filament cartridge from the system.
- Loosen the mounting screws, remove the expended filament, mount the new one and install the cartridge in the system.
- Degas the filament as in Operating Instructions.Graphic Signals

Cleaning of Titanium Film

Titanium deposits build up on the surfaces of the vacuum chamber. These deposits will flake off, adding to the surface area to be pumped and cause the pumping performance to deteriorate. Therefore, a procedure should be developed to deposit the minimum amount of titanium required for a pumping job so that the interval between cleaning operations is as long as possible.

Cleaning Methods

When cleaning is needed use one of these methods:

- Blast the internal surfaces of the pump chamber with glass beads or sand and then degrease it.

OR

- Remove loose deposits and then use the cleaning procedure for stainless steel as described in successive paragraphs.

WARNING!



Titanium flakes are flammable and may spontaneously ignite when exposed to air. A dull red, short-lived flame may result. Also, vigorous abrasion may produce sparks. Accumulated flakes may ignite at any time in the presence of air, either on or off the substrate. Do not clean up the flakes with a vacuum cleaner or leave the flakes in contact with any flammable materials; flakes should be stored in a metal container until they can be disposed of. For maximum safety during the transportation to a cleaning facility, heavily coated surfaces should be enclosed in an air-tight container.

Cleaning Procedure for Stainless Steel

WARNING!



The chemicals used in this procedure are corrosive. Only authorized trained personnel should make up the baths and process the parts. Check relevant local safety regulations.

Solvent degrease in trichloroethane or equivalent.

Hot alkali dip for about two minutes, depending on condition.

Rinse in hot tap water.

Hydrochloric acid dip. Solution: 1:1 HCl (tech) in water at 70 °C.

Rinse in cold tap water.

Nitric-hydrofluoric acid dip: concentrated HNO_3 , 97% by volume, concentrated HF 3% by volume.

Dip until surfaces gases slightly, then quickly rinse in water. Welds and knife-edge sealing surfaces will be attacked by the acid.

Excessive etching may cause pin-hole leaks in welds or marginal seals.

Rinse in cold tap water three times.

Rinse in cold deionized water (NaCl less than 1 ppm) three times.

Methanol rinse (electronic grade).

Warm air dry in clean, filtered, fume-free air at about 65 °C.

(Optional) Air bake at 150 °C to 400 °C for 30 minutes to one hour, depending on the mass of the part.

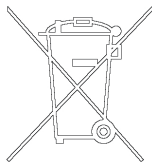
Disposal

Meaning of the "WEEE" logo found in labels

The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment) Directive.

This symbol (valid only in countries of the European Community) indicates that the product it applies to must NOT be disposed of together with ordinary domestic or industrial waste but must be sent to a differentiated waste collection system.

The end user is therefore invited to contact the supplier of the device, whether the Parent Company or a retailer, to initiate the collection and disposal process after checking the contractual terms and conditions of sale.



Parts List

Replacement Part List

Tab. 4

Replacement filament package	916-0051
Consists of:	
12 filaments	
6 screws 8-32 x ¼ lg	
3 screws 8-32 x 5/8 lg	
3 nuts 8-32	

Accessories

Tab. 5

Description	Part Number
ConFlat flange copper gasket (pkg of 10)	FG0275CI
European markets:	
Interconnection cable	929-0730
Mini Ti-Ball/TSP control unit	929-0023
(order cable separately)	(220 V)
US markets:	
Interconnection cable	924-0730
Mini Ti-Ball/TSP control unit	929-0022
(order cable separately)	(120 V)

1 **Instructions for Use**

Parts List



Agilent Technologies

Vacuum Products Division

Dear Customer,

Thank you for purchasing an Agilent vacuum product. At Agilent Vacuum Products Division we make every effort to ensure that you will be satisfied with the product and/or service you have purchased.

As part of our Continuous Improvement effort, we ask that you report to us any problem you may have had with the purchase or operation of our products. On the back side you find a Corrective Action request form that you may fill out in the first part and return to us.

This form is intended to supplement normal lines of communications and to resolve problems that existing systems are not addressing in an adequate or timely manner.

Upon receipt of your Corrective Action Request we will determine the Root Cause of the problem and take the necessary actions to eliminate it. You will be contacted by one of our employees who will review the problem with you and update you, with the second part of the same form, on our actions.

Your business is very important to us. Please, take the time and let us know how we can improve.

Sincerely,

Giampaolo LEVI

***Vice President and General Manager
Agilent Vacuum Products Division***

Note: Fax or mail the Customer Request for Action (see backside page) to Agilent Vacuum Products Division (Torino) – Quality Assurance or to your nearest Agilent representative for onward transmission to the same address.

CUSTOMER REQUEST FOR CORRECTIVE / PREVENTIVE / IMPROVEMENT ACTION

TO: AGILENT VACUUM PRODUCTS DIVISION TORINO – QUALITY ASSURANCE

FAX N°: XXXX-011-9979350

ADDRESS: AGILENT TECHNOLOGIES ITALIA S.p.A. – Vacuum Products Division –
Via F.lli Varian, 54 – 10040 Leinì (TO) – Italy

E-MAIL: vpd-qualityassurance_pdl-ext@agilent.com

NAME _____	COMPANY _____	FUNCTION _____
ADDRESS: _____ _____		
TEL. N° : _____ FAX N° : _____		
E-MAIL: _____		
PROBLEM / SUGGESTION : _____ _____ _____ _____ _____		
REFERENCE INFORMATION (model n°, serial n°, ordering information, time to failure after installation, etc.): _____ _____ _____ _____		
		DATE _____
CORRECTIVE ACTION PLAN / ACTUATION (by AGILENT VPD) _____ _____ _____ _____ _____ _____		LOG N° _____

XXX = Code for dialing Italy from your country (es. 01139 from USA; 00139 from Japan, etc.)



Vacuum Products Division Instructions for returning products

Dear Customer:

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

- 1) Complete the attached Request for Return form and send it to Agilent Technologies (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, Agilent Technologies 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, eg).

- 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, please use the packaging from the Advance Exchange to return the defective product.
- Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
- Agilent Technologies is not responsible for returning customer provided packaging or containers.
- **Clearly label package with RA number.** Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a 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 a 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:

EUROPE:

Fax: 00 39 011 9979 330

Fax Free: 00 800 345 345 00

Toll Free: 00 800 234 234 00

vpt-customer@agilent.com

NORTH AMERICA:

Fax: 1 781 860 9252

Toll Free: 800 882 7426, Option 3

vpl-ra@agilent.com

PACIFIC RIM:

please visit our website for individual office information

<http://www.agilent.com>



Vacuum Products Division Request for Return Form (Health and Safety Certification)

Please read important policy information on Page 3 that applies to all returns.

1) CUSTOMER INFORMATION

Company Name:		Contact Name:
Tel:	Email:	Fax:
Customer Ship To:		Customer Bill To:
Europe only: VAT reg. Number:		USA/Canada only: ☐ Taxable ☐ Non-taxable

2) PRODUCT IDENTIFICATION

Product Description	Agilent P/N	Agilent S/N	Original Purchasing Reference

3) TYPE OF RETURN (Choose one from each row and supply Purchase Order if requesting a billable service)

- 3A. ☐ Non-Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form):
- 3B. ☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.

Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

☐

HAS NOT pumped or been exposed to any toxic or hazardous materials. OR

☐

HAS pumped or been exposed to the following toxic or hazardous materials. If this box is checked, the following information must also be filled out. Check boxes for all materials to which product(s) pumped or was exposed:

☐ Toxic☐ Corrosive☐ Reactive☐ Flammable☐ Explosive☐ Biological☐ Radioactive

List all toxic/hazardous materials. Include product name, chemical name, and chemical symbol or formula:

NOTE: If a product is received at Agilent which is contaminated with a toxic or hazardous material that was not disclosed, the customer will be held responsible for all costs incurred to ensure the safe handling of the product, and is liable for any harm or injury to Agilent employees as well as to any third party occurring as a result of exposure to toxic or hazardous materials present in the product.

Print Name:

Authorized Signature:

Date:

5) FAILURE INFORMATION:

Failure Mode (REQUIRED FIELD. See next page for suggestions of failure terms):
Detailed Description of Malfunction: (Please provide the error message)
Application (system and model):

I understand and agree to the terms of Section 6, Page 3/3.

Print Name:

Authorized Signature:

Date:



**Vacuum Products Division
Request for Return Form
(Health and Safety Certification)**

Please use these Failure Mode to describe the concern about the product on Page 2.

TURBO PUMPS and TURBO CONTROLLERS

APPARENT DEFECT/MALFUNCTION	POSITION	PARAMETERS
- Does not start - Does not spin freely - Does not reach full speed - Mechanical Contact - Cooling defective	- Noise - Vibrations - Leak - Overtemperature - Clogging	- Vertical - Horizontal - Upside-down - Other:
		Power: Rotational Speed: Current: Inlet Pressure: Temp 1: Foreline Pressure: Temp 2: Purge flow: OPERATING TIME:

ION PUMPS/CONTROLLERS

- Bad feedthrough - Vacuum leak - Error code on display	- Poor vacuum - High voltage problem - Other
---	--

VALVES/COMPONENTS

- Main seal leak - Solenoid failure - Damaged sealing area	- Bellows leak - Damaged flange - Other
--	---

LEAK DETECTORS

- Cannot calibrate - Vacuum system unstable - Failed to start	- No zero/high background - Cannot reach test mode - Other
---	--

INSTRUMENTS

- Gauge tube not working - Communication failure - Error code on display	- Display problem - Degas not working - Other
--	---

SCROLL AND ROTARY VANE PUMPS

- Pump doesn't start - Doesn't reach vacuum - Pump seized	- Noisy pump (describe) - Over temperature - Other
---	--

DIFFUSION PUMPS

- Heater failure - Doesn't reach vacuum - Vacuum leak	- Electrical problem - Cooling coil damage - Other
---	--

Section 6) **ADDITIONAL TERMS**

Please read the terms and conditions below as they apply to all returns and are in addition to the Agilent Technologies Vacuum Product Division – Products and Services Terms of Sale.

- Customer is responsible for the freight charges for the returning product. Return shipments must comply with all applicable **Shipping Regulations** (IATA, DOT, etc.) and carrier requirements.
- Customers receiving an Advance Exchange product agree to return the defective, rebuildable part to Agilent Technologies **within 15 business days**. Failure to do so, or returning a non-rebuildable part (crashed), will result in an invoice for the non-returned/non-rebuildable part.
- Returns for credit toward the purchase of new or refurbished Products are subject to prior Agilent approval and may incur a restocking fee. Please reference the original purchase order number.
- Units returned for evaluation will be evaluated, and a quote for repair will be issued. If you choose to have the unit repaired, the cost of the evaluation will be deducted from the final repair pricing. A Purchase Order for the final repair price should be issued within 3 weeks of quotation date. Units without a Purchase Order for repair will be returned to the customer, and the evaluation fee will be invoiced.
- A Special Cleaning fee will apply to all exposed products per Section 4 of this document.
- If requesting a calibration service, units must be functionally capable of being calibrated.

Sales and Service Offices

United States

Agilent Technologies
Vacuum Products Division
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel.: +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426

Benelux

Agilent Technologies Netherlands B.V.
Vacuum Products Division
Herculesweg 8
4338 PL Middelburg
The Netherlands
Tel.: +31 118 671570
Fax: +31 118 671569
Toll-Free: 00 800 234 234 00

Canada

Central coordination through: Agilent Technologies
Vacuum Products Division
121 Hartwell Avenue
Lexington, MA 02421 - USA
Tel.: +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426

China

Agilent Technologies (China) Co. Ltd
Vacuum Products Division
No.3, Wang Jing Bei Lu,
Chao Yang District,
Beijing, 100102
China
Tel.: +86 (10) 6439 7718
Toll-Free: 800 820 6556

France

Agilent Technologies France
Vacuum Products Division
7 Avenue des Tropiques
Z.A. de Courtaboeuf - B.P. 12
91941 Les Ulis cedex - France
Tel.: +33 (0) 1 69 86 38 84
Fax: +33 (0) 1 69 86 29 88
Toll free: 00 800 234 234 00

Germany and Austria

Agilent Technologies
Vacuum Products Division Alsfelder Strasse 6 Postfach 11
14 35
64289 Darmstadt – Germany
Tel.: +49 (0) 6151 703 353
Fax: +49 (0) 6151 703 302
Toll free: 00 800 234 234 00

India

Agilent Technologies India Pvt. Ltd.
Vacuum Product Division
G01. Prime corporate Park,
230/231, Sahar Road, Opp. Blue Dart Centre,
Andheri (East), Mumbai – 400 099.India
Tel: +91 22 30648287/8200
Fax: +91 22 30648250
Toll Free: 1800 113037

Italy

Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54
10040 Leini, (Torino) - Italy
Tel.: +39 011 997 9111 Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00

Japan

Agilent Technologies Japan, Ltd.
Vacuum Products Division
8th Floor Sumitomo Shibaura Building
4-16-36 Shibaura Minato-ku Tokyo 108-0023 - Japan
Tel.: +81 3 5232 1253
Fax: +81 3 5232 1710
Toll-Free: 0120 655 040

Korea

Agilent Technologies Korea, Ltd.
Vacuum Products Division
Shinsa 2nd Bldg. 2F 966-5 Daechi-dong
Kangnam-gu, Seoul
Korea 135-280
Tel.: +82 2 3452 2452
Fax: +82 2 3452 2451
Toll-Free: 080 222 2452

Mexico

Agilent Technologies
Vacuum Products Division
Concepcion Beistegui No 109 Col Del Valle
C.P. 03100 – Mexico, D.F.
Tel.: +52 5 523 9465
Fax: +52 5 523 9472

Singapore

Agilent Technologies Singapore Pte. Ltd.
Vacuum Products Division
Agilent Technologies Building,
1 Yishun Avenue 7,
Singapore 768923
Tel : (65) 6215 8045
Fax : (65) 6754 0574

Southeast Asia

Agilent Technologies Sales Sdn Bhd
Vacuum Products Division
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya,
Selangor, Malaysia
Tel : +603 7712 6106
Fax: +603 6733 8121

Taiwan

Agilent Technologies Taiwan Limited
Vacuum Products Division (3F)
20 Kao-Shuang Rd.,
Pin-Chen City, 324
Taoyuan Hsien , Taiwan, R.O.C.
Tel. +886 34959281
Toll Free: 0800 051 342

UK and Ireland

Agilent Technologies UK, Ltd.
Vacuum Products Division
6 Mead Road Oxford Industrial Park
Yarnton, Oxford OX5 1QU – UK
Tel.: +44 (0) 1865 291570
Fax: +44 (0) 1865 291571
Toll free: 00 800 234 234 00

Other Countries

Agilent Technologies Italia S.p.A.
Vacuum Products Division
Via F.lli Varian 54 10040 Leini, (Torino) -
Italy
Tel.: +39 011 997 9111
Fax: +39 011 997 9350
Toll-Free: 00 800 234 234 00

Customer Support & Service

NORTH AMERICA:

Toll Free: 800 882 7426, Option 3
vpl-ra@agilent.com

EUROPE:

Toll Free: 00 800 234 234 00
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