Agilent Technologies

Vacuum Products Division

CE

Vacuum Gauge Display

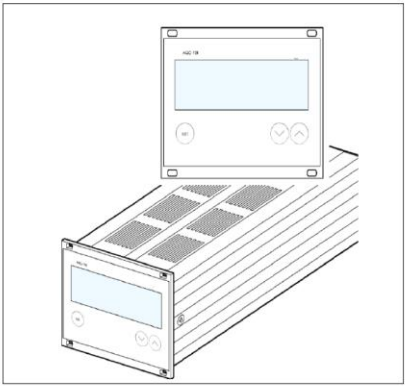
AGD-100

Operating Instructions

Manual No. TQNb16e1
Revision 1
March 2012

Vacuum Gauge Display

AGD-100



Declaration of Conformity
Konformitätserklärung
Déclaration de Conformité
Declaración de Conformidad
Verklaring de Overeenstemming
Dichiarazione di Conformità
一致性声明
適合宣言
적합성 선언

Agilent Technologies

CE

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Nosotros
Wij
Noi
我们
私たち
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Agilent Technologies
121 Hartwell Ave.
Lexington, MA 02421-3133 USA

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verklaren onder onze verantwoordelijkheid, dat het product,
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Vacuum Gauge Display AGD-100

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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).
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a cui se riferisce questa dichiarazione è conforme alla/e sequente/l norma/o documento/l normativo/i.
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이 선언과 관련한 제품이 다음의 표준과 기타 표준 문서를 준수한다는 것을 선언합니다.

- EN 61010 1:2001 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326 1:2006 (Electrical equipment for measurement, control and laboratory use; general EMC requirements)
- EN 61326 2 2:2006 (Electrical equipment for measurement, control and laboratory use; particular EMC requirements)

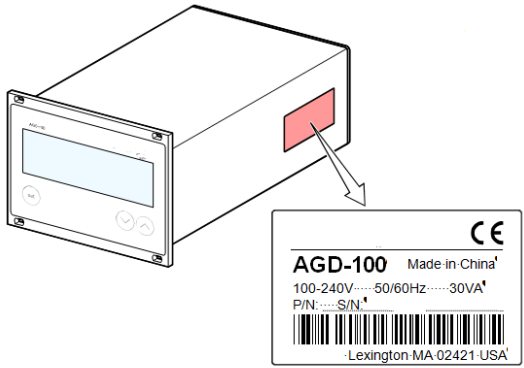
John Ehmann
Operations Manger
Agilent, Inc.
Vacuum products Division
Lexington, MA USA

Contents

For cross-references within this document, the symbol (→ 🗎 XY) is used, for cross-references to further documents, listed under "Further Information", the symbol (→ 🕮 [Z]).

Product Identification

In all communications with Agilent, please specify the information on the product nameplate. For convenient reference copy that information into the space provided below:



Validity

This document applies to products with part number AGD100.

The part number (PN) can be taken from the product nameplate.

This document is based on firmware number F-2.xx.

If your unit does not work as described in this document, please check that it is equipped with the above firmware version (→ 🗎 22).

We reserve the right to make technical changes without prior notice.

All dimensions are indicated in mm.

Intended Use

The Vacuum Gauge Display AGD-100 is used together with an Agilent

- Pirani Standard Gauge of the PVG-5xx series
- Pirani Capacitance Diaphragm Gauge of the PCG-75x series
- Inverted Magnetron Pirani Gauge of the FRG-70x series

for total pressure measurement. All products must be operated in accordance with their respective Instruction Manuals.

Scope of Delivery

1× Vacuum Gauge Display

1× Power cord

1× Instruction Manual

1 Safety

1.1 Symbols Used

DANGER

Information on preventing any kind of physical injury.

WARNING

Information on preventing extensive equipment and environmental damage.

Caution

Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

Further symbols

The lamp/display is lit.

The lamp/display is dark.

Press the key (example: 'set' key).

Do not press any key

1.2 Personnel Qualifications

Skilled personnel

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

1.3 General Safety Instructions

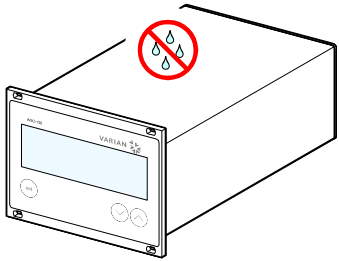
Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.

DANGER

DANGER: mains voltage

Contact with live parts is extremely hazardous when any liquids penetrate into the unit.

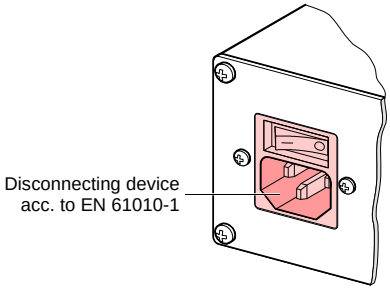
Make sure no liquids penetrate into the equipment.



Disconnecting device

The disconnecting device must be readily identifiable and easily reached by the user.

To disconnect the controller from mains, you must unplug the mains cable.



Communicate the safety instructions to all other users.

1.4 Liability and Warranty

Agilent assumes no liability and the warranty becomes null and void if the end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the product documentation.

2 Technical Data

Mains specifications

Voltage	100 … 240 VAC
Frequency	50 … 60 Hz
Power consumption	≤30 VA
Overvoltage category	II
Protection class	1
Connection	European appliance connector IEC 320 C14

Ambiance

Temperature	
Storage	–20 … +60 °C
Operation	+ 5 … +50 °C
Relative humidity	≤80% up to +31 °C, decreasing to 50% at +40 °C
Use	indoors only max. altitude 2000 m NN
Pollution degree	II
Degree of protection	IP20 (EN 60529)

Compatible gauges

Number	1	
Compatible types		
Pirani	PVG	(PVG-500, PVG-502, PVG-550, PVG-552)
Pirani/Capacitive	PCG	(PCG-750, PCG-752)
Cold cathode/Pirani	FRG	(FRG-700, FRG-702)

Gauge connection

SENSOR connector	RJ45 (FCC68), female (pin assignment → 🗎 19)

Operation

Front panel	via 3 keys

Measurement values

Measurement range (air, O_2, CO, N_2)		5×10^{-4} … 1000 mbar (+1.9 … +10.0 VDC) (→ 🕮 [1],[3],[4])
Measurement error		
Gain error		≤0.02% FSr
Offset error		≤0.05% FSr
Measurement rate		30 / s
Display rate		50 / s
Filter time constant		150 ms (f_g = 1 Hz)
Pressure units		mbar, Pa, Torr

Gauge supply

Voltage	+24 VDC ±5%
Current	750 mA
Power consumption	18 W
Fuse protection	900 mA with PTC element, self-resetting after turning the AGD-100 off or disconnecting the gauge

Switching function

Number		1
Reaction delay		≤10 ms if switching threshold close to measurement value (for larger differences consider filter time constant).
Adjustment range		
PVG		1×10^{-3} … 500 mbar
	default	1×10^{-3} mbar
PCG		1×10^{-4} … 500 mbar
	default	1×10^{-4} mbar
FRG		1×10^{-8} … 500 mbar
	default	1×10^{-8} mbar
Hysteresis		≥10% of measurement value

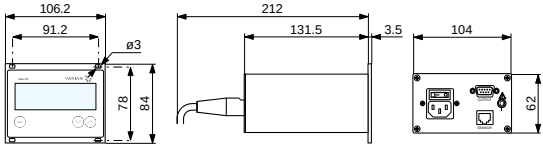
Switching function relay

Contact type	floating changeover contact
Load max.	60 VDC, 1 A (ohmic) 50 VAC, 5 A (ohmic)
Service life	
Mechanic	10^8 cycles
Electric	10^5 cycles (at maximum load)
Contact positions	→ 20
OUTPUT connector	9-pin D-Sub, male (pin assignment → 20)

Analog output

Number	1
Voltage range	0 … +10 V
Internal resistance	660 Ω
Measurement signal vs. pressure	logarithmic, 1.286 V/decade
OUTPUT connector	9-pin D-Sub, male (pin assignment → 20)

Dimensions [mm]



Use	For incorporation into a control panel
Weight	0.85 kg

3 Installation

DANGER

DANGER: damaged product

Putting a damaged product into operation can be extremely hazardous.

In case of visible damages, make sure the product is not put into operation.

3.1 Installation in a Control Panel

The AGD-100 is suited for incorporation into a control panel.

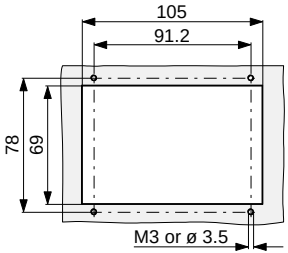
DANGER

DANGER: protection class of the control panel

If the product is installed in a rack, it is likely to lower the protection class of the rack (protection against foreign bodies and water) e.g. according to the EN 60204-1 regulations for switching cabinets.

Take appropriate measures for the control panel to meet the specifications of the protection class.

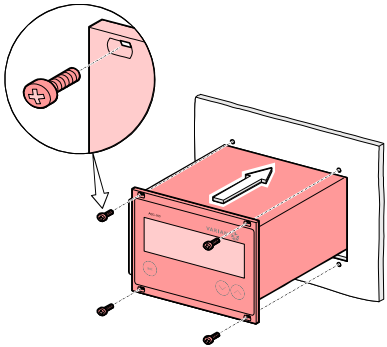
For mounting the AGD-100 into a control panel, the following cut-out is required:



The admissible maximum ambient temperature (→ 12) must not be exceeded neither the air circulation obstructed.

For reducing the mechanical strain on the front panel, preferably support the unit.

Slide the AGD-100 into the cut-out of the control panel …



… and secure it with four M3 or equivalent screws.

3.2 Mains Power Connector

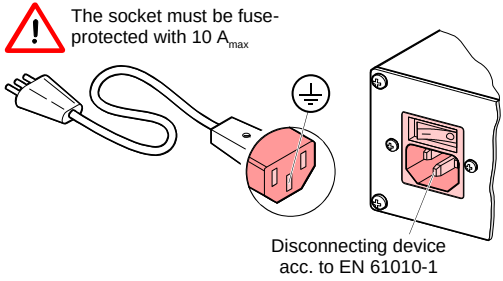
DANGER

DANGER: line voltage

Incorrectly grounded products can be extremely hazardous in the event of a fault.

Use only a 3-conductor power cable (3×1.5 mm^2) with protective ground. The power connector may only be plugged into a socket with a protective ground. The protection must not be nullified by an extension cable without protective ground.

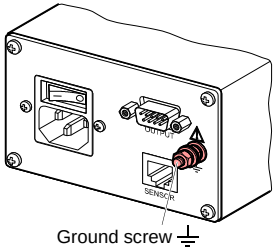
The unit is supplied with a 2 m power cord. If the mains cable is not compatible with your system, use your own, suitable cable with protective ground.



If the unit is installed in a switch cabinet, the mains voltage should be supplied and turned on via a central power distributor.

Grounding

On the rear of the unit, there is a screw which can be used to connect the unit to ground, e.g. using the grounding of the pumping station.



3.3 SENSOR Connector

Connect the gauge to the SENSOR connector on the rear of the unit. Use a screened 1:1 cable (electromagnetic compatibility). Make sure the gauge is compatible (→ 12).

DANGER

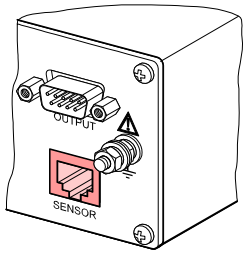
DANGER: protective low voltage

According to EN 61010, voltages exceeding 30 VAC or 60 VDC are hazardous.

Only connect a protective low voltage (SELV).

Pin assignment SENSOR

Pin assignment of the 8-pin RJ45 appliance connector:



Pin	Signal	
4	Identification	
1	Supply	+24 VDC
2	Supply common	GND
3	Signal input	(Measurement signal+)
5	Signal common	(Measurement signal–)
6	not connected	
7	not connected	
8	not connected	

3.4 OUTPUT Connector

This connector allows to read the measurement signal and to evaluate state of the floating switching function.

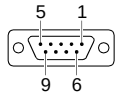
Connect the peripheral components to the OUTPUT connector on the rear of the unit. Use a screened cable (electromagnetic compatibility).

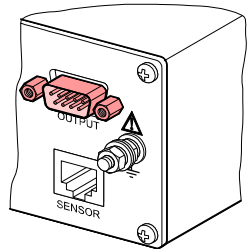
DANGER

DANGER: protective low voltage
According to EN 61010, voltages exceeding 30 VAC or 60 VDC are hazardous.
Only connect a protective low voltage (SELV).

Pin assignment, Contact positions OUTPUT

Pin assignment of the female 9-pin D-Sub appliance connector:

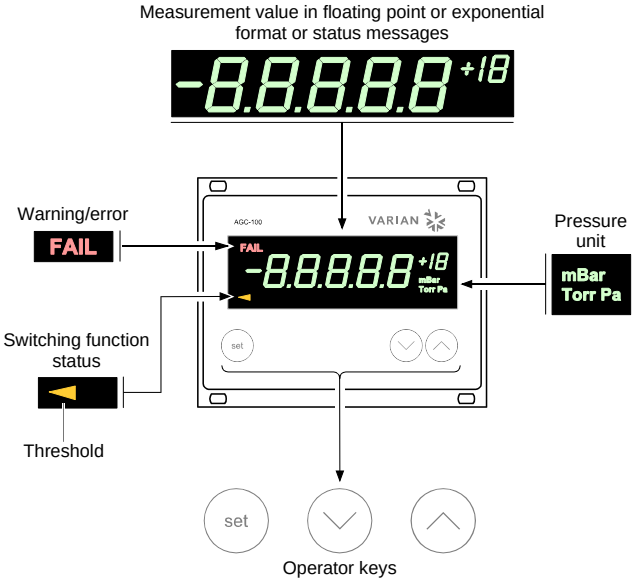




Pin	Signal
1	Analog output 0 … +10 VDC
2	Chassis = GND
3	Pressure below threshold
4	
5	Pressure above threshold or power supply turned off
9	not connected
8	not connected
6	not connected
7	not connected

4 Operation

4.1 Front Panel



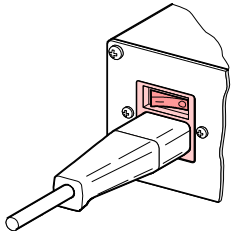
4.2 Turning the AGD-100 On and Off

Make sure the AGD-100 is correctly installed and the specifications in the Technical Data are met.

Turning the AGD-100 on

The power switch is on the rear of the unit.

Turn the AGD-100 on with the power switch (or centrally, via a switched power distributor, if the unit is incorporated in a rack).



After power on, the AGD-100 …

- automatically performs a self-test
- displays the firmware version F-2.xx for 3 s
- displays the gauge type for 3 s
- activates the parameters that were in effect before the last power off
- switches to the Measurement mode

Turning the AGD-100 off

Turn the AGD-100 off with the power switch (or centrally, via a switched power distributor, if the unit is incorporated in a rack).

Wait at least 10 s before turning the AGD-100 on again in order for it to correctly initialize itself.

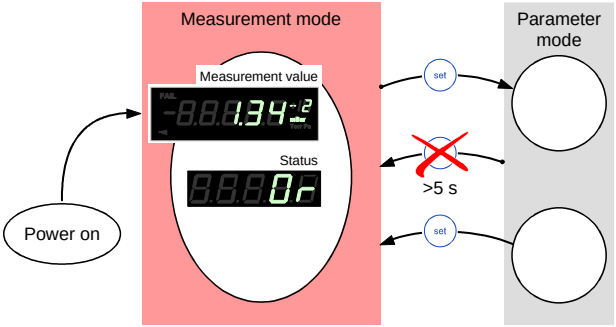
4.3 Operating Modes

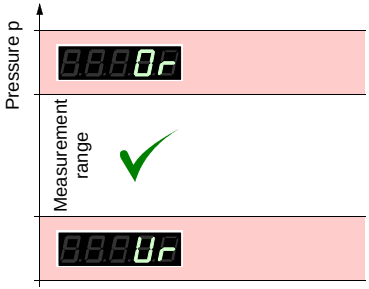
The AGD-100 works in the following operating modes:

- Measurement mode
  for displaying measurement values or status messages
  (→ 24)
- Parameter mode
  for entering or displaying parameters (→ 25)

4.4 Measurement Mode

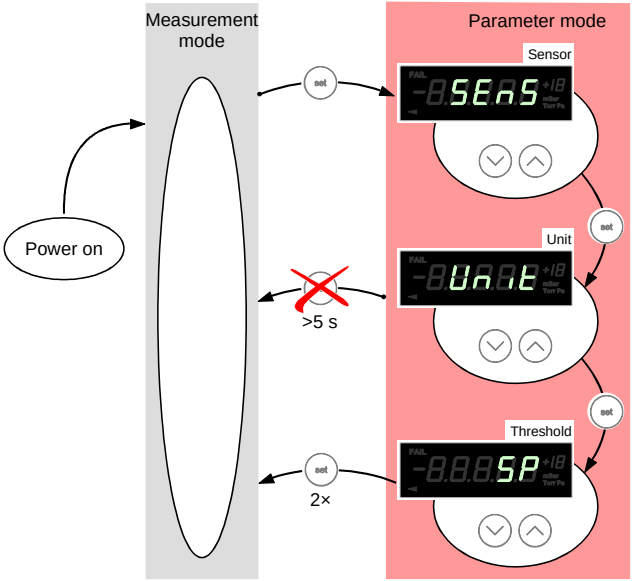
The Measurement mode is the standard operating mode of the AGD-100. Measurement values and status messages (→ 30) are displayed in this mode.





4.5 Parameter Mode

The Parameter mode is used for displaying, editing and entering parameter values.



Selecting a parameter

⇨ The name of the parameter

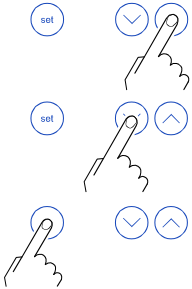
e.g.: 

Sensor

is displayed as long as the key is pressed or at least for 1 s.

Afterwards, the currently valid parameter value is displayed.

Editing the parameter value



⇨ Press key <1 s:
The value is increased / decreased by 1 increment.

Press key >1 s:
The value is increased / decreased continuously.

⇨ Save the modificated parameter value.

4.5.1 Gauge Identification

Type of the selected gauge is displayed.

⇨ Pirani gauge
(PVG-500, PVG-502) (default)

⇨ Pirani/Capacitive gauge
(PCG-750, PCG-752)

⇨ Cold cathode/Pirani gauge
(FRG-700, FRG-702)

4.5.2 Pressure unit

Unit of measured values, thresholds etc.

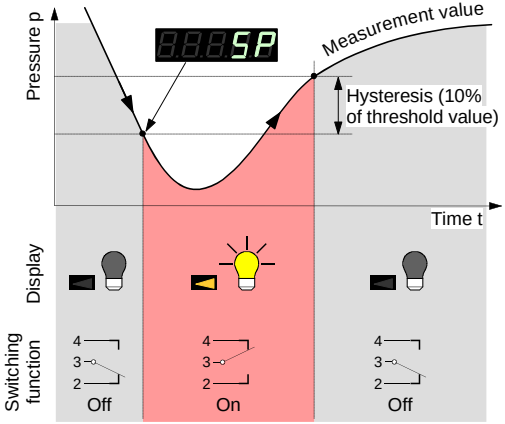
⇨ mbar (default)

⇨ Torr

⇨ Pascal

4.5.3 Switching threshold

The AGD-100 has a switching function with one adjustable threshold. The status of the switching function is displayed on the front panel (→ 21) and can be evaluated via the floating contact at the CONTROL connector (→ 19).



	Value
	The switching threshold defines the pressure at which the switching function is activated when the pressure is dropping.
e.g.: 	(default)

5 Maintenance, Repair

The product requires no maintenance.

Cleaning the AGD-100

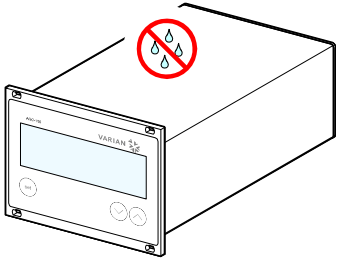
For cleaning the outside of the AGD-100, a slightly moist cloth will usually do. Do not use any aggressive or scouring cleaning agents.

DANGER

DANGER: mains voltage

Contact with live parts is extremely hazardous when any liquids penetrate into the unit.

Make sure no liquids penetrate into the equipment.



6 Troubleshooting

Signalization of errors

Error messages

	Possible cause and remedy / acknowledgement
	Interruption or instability in sensor line or connector (Sensor error).

	Possible cause and remedy / acknowledgement
	Pirani error (sensor defective). ⇨ Replace the sensor

Status messages

	Possible cause and remedy / acknowledgement
	0.5 V < measurement signal < 1.5 V ⇨ Adjust the gauge (→ 🕮 [1],[3],[4]).
	10.3 V < measurement signal < 13.7 V ⇨ Adjust the gauge (→ 🕮 [1],[3],[4]).

Technical support

If the problem persists after the message has been acknowledged for several times and/or the gauge has been exchanged, please contact your local Agilent service center.

7 Repair

Please contact your local Agilent service center.

Agilent assumes no liability and the warranty becomes null and void if repair work is carried out by the end-user or third parties.

8 Storage

Caution

Caution: electronic component

Inappropriate storage (static electricity, humidity etc.) can damage electronic components.

Store the product in a bag or container. Observe the corresponding specifications in the technical data (→ 12).

9 Disposal

DANGER

DANGER: contaminated parts

Contaminated parts can be detrimental to health and environment.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

WARNING

WARNING: substances detrimental to the environment

Products or parts thereof (mechanical and electric components, operating fluids etc.) can be detrimental to the environment.

Dispose of such substances in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

- Contaminated components

  Contaminated components (radioactive, toxic, caustic or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and disposed of.

- Other components

  Such components must be separated according to their materials and recycled.

Appendix

A: Default Parameters

	Default	User	
	PVG		
	mbar		
	10^{-3} mbar		

B: Literature

📖 [1] www.agilent.com
Operating Manual
Pirani Standard Gauge
PVG-500, PVG-502
tqna69e1
Agilent Technologies, Lexington, MA 02421, USA

📖 [2] www.agilent.com
Operating Manual
Pirani Standard Gauge
PVG-550, PVG-552
tqna79e1
Agilent Technologies, Lexington, MA 02421, USA

📖 [3] www.agilent.com
Operating Manual
Pirani Capacitance Diaphragm Gauge
PCG-750, PVG-752
tqna77e1
Agilent Technologies, Lexington, MA 02421, USA

📖 [4] www.agilent.com
Operating Manual
Inverted Magnetron Pirani Gauge
FRG-700, FRG-702
tqna74e1
Agilent Technologies, Lexington, MA 02421, USA

Notes

Notes

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:	NORTH AMERICA:	PACIFIC RIM:
Fax: 00 39 011 9979 330		
Fax Free: 00 800 345 345 00	Fax: 1 781 860 9252	please visit our website for individual
Toll Free: 00 800 234 234 00	Toll Free: 800 882 7426, Option 3	office information
vpt-customercare@agilent.com	vpl-ra@agilent.com	http://www.agilent.com

Agilent Technologies

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:**

Agilent Technologies

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

ION PUMPS/CONTROLLERS

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

VALVES/COMPONENTS

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

LEAK DETECTORS

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

INSTRUMENTS

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

SCROLL AND ROTARY VANE PUMPS

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

DIFFUSION PUMPS

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

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Published in USA, October, 2011

Agilent Technologies