



Agilent Technologies

Vacuum Products Division



Operating Instructions

Pirani Capacitance Diaphragm Gauge

PCG-750 PCG-752



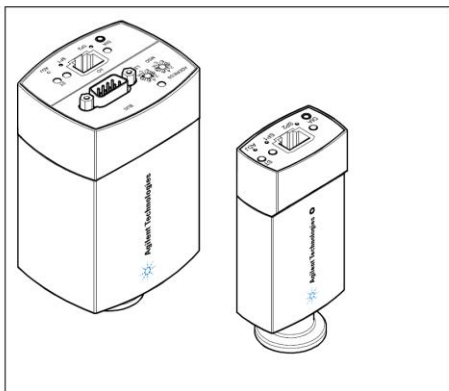
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Pirani Capacitance Diaphragm Gauge

PCG-750 PCG-752



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



Declaration of Conformity
Konformitätserklärung
Déclaration de Conformité
Declaración de Conformidad
Verklaring de Overeenstemming
Dichiarazione di Conformità
一致性声明

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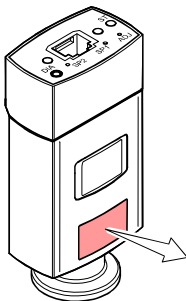
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이 선언과 관련한 제품이 다음의 표준과 기타 표준 문서를 준수한다는 것을 선언합니다.

- EN 61000 6 2:2005 (EMC: generic immunity standard)
- EN 61000 6 3:2007 (EMC: generic emission standard)
- EN 61010 1:2001 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326 1:2006 (EMC requirements for electrical equipment for measurement, control and laboratory use)

John Ehmann
Operations Manager
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Product Identification

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



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Agilent Lexington MA 02421 USA

Model: _____

PN: _____

SN: _____

_____ V _____ W

Made in Liechtenstein



Validity

This document applies to products with the following part numbers:

PCG-750 (W filament)

PCG750CF16	DN 16 CF-F, w/o display, mbar
PCG750CF16SD1	DN 16 CF-F, with two switching functions and display, mbar
PCG750CF16SD2	DN 16 CF-F, with two switching functions and display, Torr
PCG750CF16SD3	DN 16 CF-F, with two switching functions and display, Pa
PCG750CF16SP	DN 16 CF-F, Profibus, with two switching functions, w/o display, mbar
PCG750KF16	DN 16 ISO-KF, w/o display, mbar
PCG750KF16SD1	DN 16 ISO-KF, with two switching functions and display, mbar

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PCG750KF16SD2	DN 16 ISO-KF, with two switching functions and display, Torr
PCG750KF16SD3	DN 16 ISO-KF, with two switching functions and display, Pa
PCG750KF16SP	DN 16 ISO-KF, Profibus, with two switching functions, w/o display, mbar

PCG-752 (Ni filament)

PCG752CF16	DN 16 CF-F, mbar
PCG752CF16SD1	DN 16 CF-F, with two switching functions and display, mbar
PCG752CF16SD2	DN 16 CF-F, with two switching functions and display, Torr
PCG752CF16SD3	DN 16 CF-F, with two switching functions and display, Pa
PCG752CF16SP	DN 16 CF-F, Profibus, with two switching functions, w/o display, mbar
PCG752KF16	DN 16 ISO-KF, mbar
PCG752KF16SD1	DN 16 ISO-KF, with two switching functions and display, mbar
PCG752KF16SD2	DN 16 ISO-KF, with two switching functions and display, Torr
PCG752KF16SD3	DN 16 ISO-KF, with two switching functions and display, Pa
PCG752KF16SP	DN 16 ISO-KF, Profibus, with two switching functions, w/o display, mbar

The part number (PN) can be taken from the product nameplate. If not indicated otherwise in the legends, the illustrations in this document correspond to gauges with part number PCG752KF16SD1. They apply to gauges with other part numbers by analogy.

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

All dimensions in mm.



Intended Use

The Pirani Capacitance Diaphragm Gauge PCG-75x has been designed for vacuum measurement of gases in the pressure range of 5×10^{-5} ... 1500 mbar.

It must not be used for measuring flammable or combustible gases in mixtures containing oxidants (e.g. atmospheric oxygen) within the explosion range.

The gauge is intended for operation in connection with an Agilent AGC-100 Vacuum Gauge Controller, an Agilent Turbo AG Rack Controller, or with another suitable controller.

Functional Principle

The PCG gauge is a combination gauge consisting of a Pirani sensor and a diaphragm capacitive sensor. Both sensors are constantly active.

At low pressures, only the signal of the Pirani sensor is used for pressure measurement; at high pressures, only the signal of the diaphragm capacitive sensor. To determine the output signal in the intermediate range, both signals are used proportionally to the pressure.

Patents

EP 0689669 B1, 0689670 B1, 0658755 B1

US Patente 5608168, 4031997, 5583297

Scope of Delivery

- 1× gauge
- 1× pin for adjusting settings via buttons
- 1× Operating Manual



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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.



Notice



Labeling



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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 the process media used.
Consider possible reactions with the product materials.
Consider possible reactions (e.g. explosion) of the process media due to the heat generated by the product.
- 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.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

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.

The end-user assumes the responsibility in conjunction with the process media used.

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. seals, filament), are not covered by the warranty.

2 Technical Data



For further technical data for gauges with Profibus interface → [3].




Measurement range	$5 \times 10^{-5} \dots 1500$ mbar
Measurement principle	diaphragm capacitive sensor
10^{-1} mbar ... 1500 mbar	crossover range
$1 \dots 10^{-1}$ mbar	thermal conductance acc. to Pirani
$5 \times 10^{-5} \dots 1$ mbar	
Accuracy (N ₂)	
$5 \times 10^{-4} \dots 1 \times 10^{-3}$ mbar	±50% of reading
$1 \times 10^{-3} \dots 100$ mbar	±15% of reading
100 ... 950 mbar	±5% of reading
950 ... 1050 mbar	±2.5% of reading
Repeatability (N ₂)	
$1 \times 10^{-3} \dots 1100$ mbar	±2% of reading
Output signal (measurement signal)	
Voltage range	0 ... +10.23 V
Measurement range	+0.61 ... +10.23 V
Error signal	0 V (default)
Voltage vs. pressure	1.286 V/decade, logarithmic
Output impedance	$2 \times 4.7 \Omega$, short circuit-proof
Load impedance	>10 kΩ
Response time	<30 ms


¹⁾ Crossover range for air, O₂, CO and N₂ 10 mbar, 100 mbar in heavy gases.

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Gauge identification	71.5 kΩ
HV adjustment	at $<10^{-5}$ mbar
ATM adjustment	at >100 mbar
Switching functions	SP1, SP2
Setting range (N ₂)	$5.0 \times 10^{-5} \dots 1500$ mbar
Hysteresis ²⁾	10% of threshold
Switching characteristics ²⁾	Low Trip Point
Type	1 floating contact (n.o.) per switching function
Contact rating	<30 VAC/DC, ≤ 1 A
closed	LED lit solid
open	LED off
Switching time	<30 ms
Diagnostic port	Jack connector 2.5 mm, 3-pin

Supply




DANGER


The gauge may only be connected to power supplies, instruments, or control devices that conform to the requirements of a grounded protective extra-low voltage (SELV). The connection to the gauge has to be fused. ³⁾

Supply voltage at the gauge	+15 ... +30 VDC
Ripple	≤ 1 V _{pp}

²⁾ The hysteresis and the switching characteristics can be programmed via the serial interface or the diagnostic port.

³⁾ Agilent controllers fulfill this requirement.

Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

Power consumption without fieldbus	≤2.5 W
with fieldbus	≤3 W
Fuse to be connected ³⁾	1 AT
Electrical connection	FCC 68
Sensor cable	shielded 0.14 mm ² /conductor
Cable length	≤100 m
RS232C operation	≤30 m
Grounding concept	→ "Power Connection"
Vacuum connection to signal common	connected via 10 kΩ, 10 nF
RS232C	
Transmission rate	57600 baud (default)
Data format	binary 8 data bits one stop bit no parity bit no handshake → "Power Connection"
For further information on the RS232C interface →  [2].	









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Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

Profibus interface

Specification, data format, communication protocol	→  [4]
Interface, physical	RS485
Data rate	≤12 Mbaud (→  [3])
Node address	
Local	
(Adjustable via hexadecimal <ADDRESS>, <MSD>, <LSD> switches)	00 ... 7D _{hex} (0 ... 125 _{dec})
Default setting	0.1C _{hex}
Via Profibus	
(hexadecimal <ADDRESS> switches set to >7D _{hex} (>125 _{dec}))	00 ... 7D _{hex} (0 ... 125 _{dec})
Profibus connection	D-Sub, 9-pin, female
Cable	shielded, special Profibus cable, →  25, →  [5]
Cable length, system wiring	according to Profibus specifications, →  [4], [5]
For further information on the Profibus interface →  [3]	

Materials exposed to vacuum

Vacuum connection	stainless steel 1.4435
Filament	
PCG-750	W
PCG-752	Ni
Feedthrough	glass
Orifice	stainless steel
Diaphragm	ceramic
Further materials	Ni, NiFe, stainless steel 1.4301, SnAg
Internal volume	4.7 cm ³
Permissible pressure (absolute)	≤5 bar
Bursting pressure (absolute)	10 bar

Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

Permissible temperatures	
Operation	+10 °C ... +50 °C
Vacuum connection ⁴⁾	≤80 °C
Filament	<160 °C
Storage	-20 °C ... +65 °C
Relative humidity	
Year's mean	≤65% (no condensation)
During 60 days	≤85% (no condensation)
Mounting orientation	any
Use	indoors only, altitude up to 2000 m NN
Degree of protection	IP 40
Weight	
w/o fieldbus interface	115 g ... 130 g
with fieldbus interface	230 g ... 250 g



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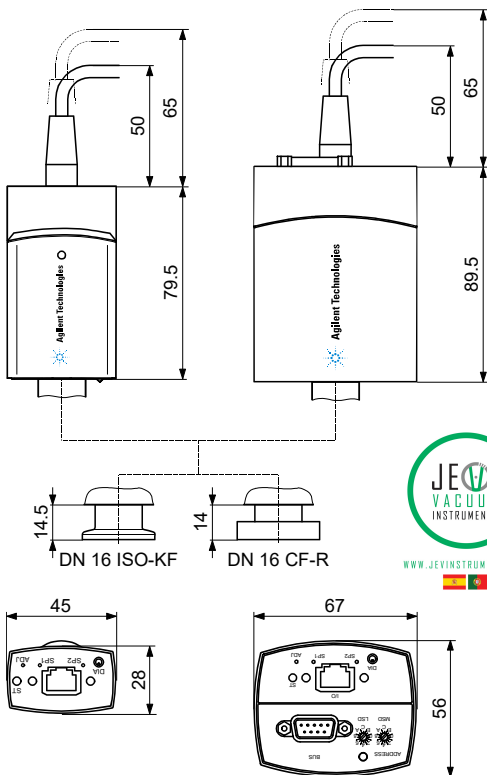
⁴⁾ For horizontal mounting orientation only. During bakeout, measurement range, accuracy, and repeatability may deviate from specifications.

Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

Dimensions [mm]

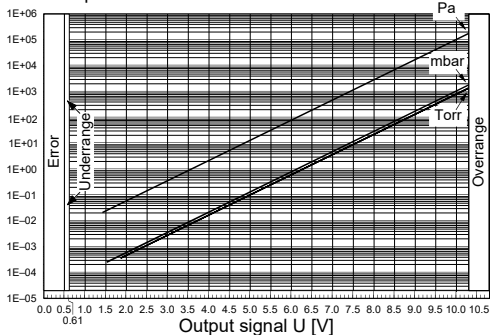
w/o Profibus

with Profibus



2.1 Output Signal vs. Pressure

Pressure p



$$p = 10^{0.778(U-c)} \quad \Leftrightarrow \quad U = c + 1.286 \log_{10} p$$

valid in the range $5 \times 10^{-5} \text{ mbar} < p < 1500 \text{ mbar}$

U	p	c	U	p	c
[V]	[mbar]	6.143	[V]	[micron]	2.448
[V]	[μbar]	2.287	[V]	[Pa]	3.572
[V]	[Torr]	6.304	[V]	[kPa]	7.429
[V]	[mTorr]	2.448			

where p pressure
U output signal
c constant (pressure unit dependent)

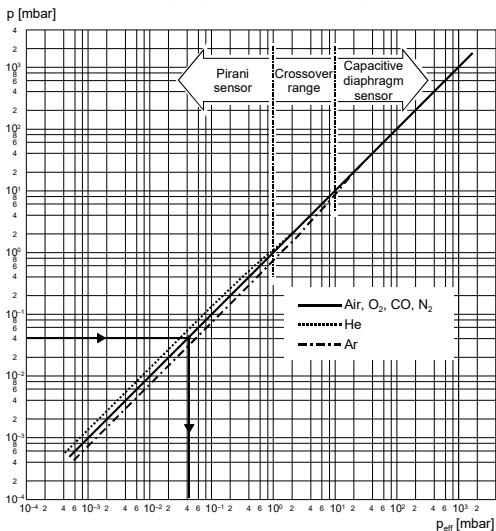


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2.2 Gas Type Dependence

Indicated pressure (gauge calibrated for air)



Calibration factors

valid for Pirani pressure range below 1 mbar

$$p_{\text{eff}} = C \times \text{indicated pressure}$$

Gas type	Calibration factor C	Gas type	Calibration factor C
He	0.8	H ₂	0.5
Ne	1.4	air, O ₂ , CO, N ₂	1.0
Ar	1.7	CO ₂	0.9
Kr	2.4	water vapor	0.5
Xe	3.0	Freon 12	0.7



3 Installation



WARNING



WARNING: fragile components

The ceramic sensor may be damaged by impacts. Do not drop the product and prevent shocks and impacts.

3.1 Vacuum Connection



DANGER



DANGER: overpressure in the vacuum system >1 bar

Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.

Do not open any clamps while the vacuum system is pressurized. Use the type clamps which are suited to overpressure.



DANGER



DANGER: overpressure in the vacuum system >2.5 bar

KF flange connections with elastomer seals (e.g. O-rings) cannot withstand such pressures. Process media can thus leak and possibly damage your health.

Use O-rings provided with an outer centering ring.



DANGER



DANGER: protective ground

Products that are not correctly connected to ground can be extremely hazardous in the event of a fault.

Electrically connect the gauge to the grounded vacuum chamber. This connection must conform to the requirements of a protective connection according to EN 61010:

- CF flanges fulfill this requirement.
- For gauges with a KF flange, use a conductive metallic clamping ring.



Caution



Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.



Caution



Caution: dirt sensitive area

Touching the product or parts thereof with bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.



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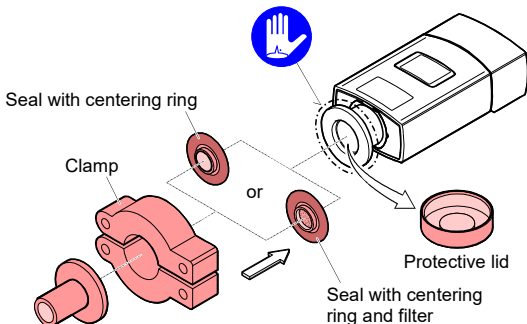


Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752



Mount the gauge so that no vibrations occur. The gauge may be mounted in any orientation. To keep condensates and particles from getting into the measuring chamber preferably choose a horizontal to upright position and consider using a seal with centering ring and filter. If adjustment should be possible after the gauge has been installed, be sure to install it so that the buttons can be accessed with a pin.

Remove the protective lid and connect the product to the vacuum system.



Keep the protective lid.



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3.2 Power Connection



Make sure the vacuum connection is properly made (→ 20).



DANGER



The gauge may only be connected to power supplies, instruments or control devices that conform to the requirements of a grounded protective extra-low voltage (SELV). The connection to the gauge has to be fused.⁵⁾



Ground loops, differences of potential, or EMC problems may affect the measurement signal. For optimum signal quality, please do observe the following notes:

- Connect the cable shield to ground on one side via the connector housing. Do not connect the other side of the shield.
- Connect the supply common with protective ground directly at the power supply.
- Use differential measurement input (signal common and supply common conducted separately).
- Potential difference between supply common and housing ≤ 18 V (overvoltage protection).



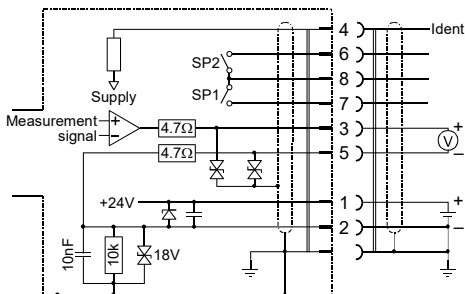
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⁵⁾ Agilent controllers fulfill these requirements.

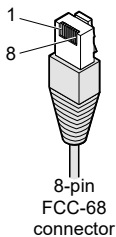
3.2.1 FCC 68 Connector

If no sensor cable is available, make one according to the following diagram. Connect the sensor cable.



Electrical connection

- Pin 1 Supply
- Pin 2 Supply common, GND
- Pin 3 Measurement signal or threshold SP1, SP2
- Pin 4 Gauge identification
- Pin 5 Signal common
- Pin 6, 8 Relay SP2
Common closing contact (com)
- Pin 7, 8 Relay SP1
Common closing contact (com)

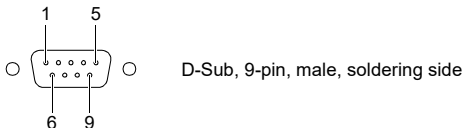


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3.2.2 Profibus Connector

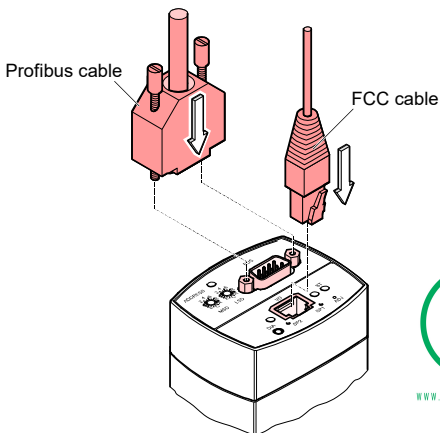
If no Profibus cable is available, make one according to the following diagram. Connect the Profibus cable.



Pin 1, 2	Do not connect	Pin 6	VP ²⁾
Pin 3	RxD/TxD-P	Pin 7, 9	Not connected
Pin 4	CNTR-P ¹⁾	Pin 8	RxD/TxD-N
Pin 5	DGND ²⁾		

¹⁾ Only to be connected if an *optical link* module is used.

²⁾ Only required as line termination for devices at both ends of bus cable
(→ [5]).



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4 Operation

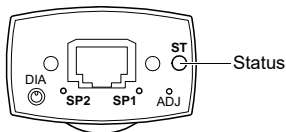
When the supply voltage is applied, the measurement signal is available at the connector (→ "Power Connection").

Allow a stabilization period of at least 10 minutes. It is advisable to operate the gauge continuously, irrespective of the pressure.

The gauge is factory calibrated. Due to long time operation or contamination, a zero drift could occur. Periodically check the zero and adjust it if necessary (adjusting the gauge → 41).

4.1 Status Indication and Display

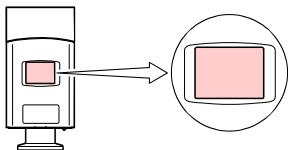
Light-emitting diodes (LEDs)



LED	State	Meaning
<ST>	off	no supply voltage
	lit green	measurement mode
	lit red	error
<SP1>	lit green	Relay SP 1 closed
	off	Relay SP 1 open
<SP2>	lit green	Relay SP 2 closed
	off	Relay SP 2 open



Liquid crystal display (LCD)

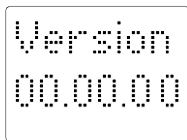


LCD	Meaning
off	no supply voltage
lit green	measurement / parameter mode
lit red	error



The display can be rotated by 180 ° via the serial interface.

Put the gauge into operation



When the supply voltage is applied the software version is briefly displayed.

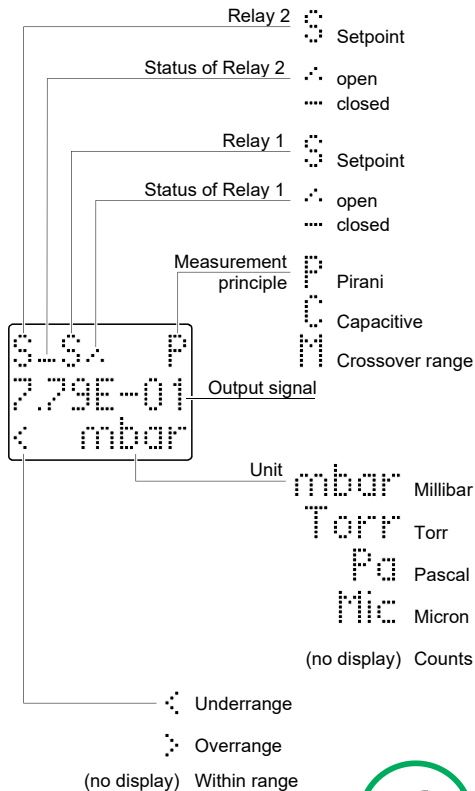


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Measurement mode

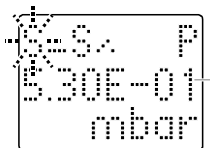


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Parameter mode

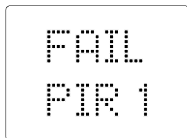


Threshold

Switching functions <S>

When the <SP1> or <SP2> button is pushed, the corresponding threshold is displayed and the corresponding relay flashes.

Error display (trouble shooting → 44)



Pirani sensor error



Diaphragm sensor error

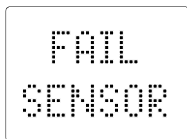


EEPROM error



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Sensor error



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4.2 Gas Type Dependence

Pressure range	Measurement principle	Gas type dependence
10^{-6} ... 1500 mbar	diaphragm capacitive sensor	independent of gas type, no correction required
$1 \dots 10^{-6}$ mbar	diaphragm capacitive sensor and Pirani sensor	crossover range
$5 \times 10^{-5} \dots 1$ mbar	Pirani sensor	proportional to pressure ⁷⁾

4.3 Switching Functions

The two switching functions can be set to any pressure within the measurement range of the gauge. A mechanical relay is provided for each switching function.

The current threshold setting

- can be read / written via the diagnostic port
- is output at the measurement signal output instead of the pressure signal, can be measured with a voltmeter, and is displayed on the LCD after the <SP1> or <SP2> button is pressed
- can be read / written via the serial interface.

⁶⁾ Crossover range for air, O₂, CO and N₂ 10 mbar, 100 mbar in heavy gases.

⁷⁾ The pressure reading applies to dry air, O₂, CO and N₂. For other gases, it has to be converted (calibration factors (→ 16)).

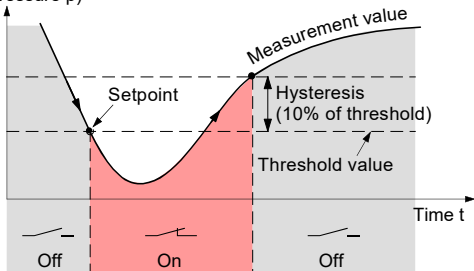
Switching characteristics and hysteresis

The switching characteristics and the hysteresis of each set point can be programmed (→ 34).

Low Trip Point (default)

If the pressure in the vacuum system is lower than the setpoint, the corresponding LED (<SP1> or <SP2>) is lit solid and the corresponding relay is closed.

Measurement signal
(Pressure p)



The setpoints SP1 and SP2 are factory set to the lower measurement range limit and therefore do not switch.



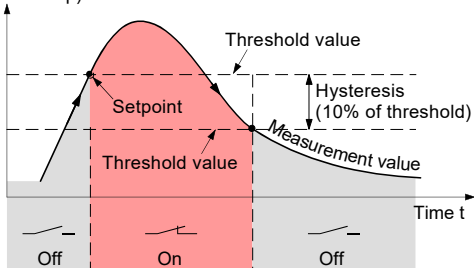
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High Trip Point

If the pressure in the vacuum system is higher than the setpoint, the corresponding LED (<SP1> or <SP2>) is lit solid and the corresponding relay is closed.

Measurement signal
(Pressure p)



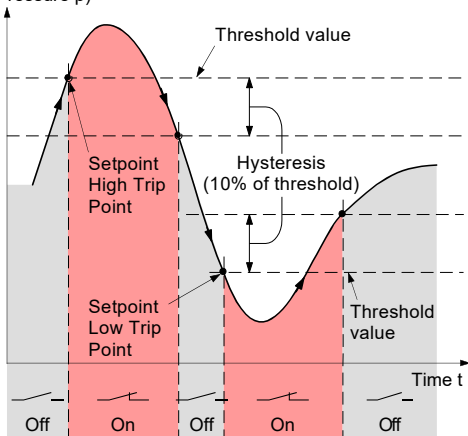
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High & Low Trip Point

Both a High Trip Point and a Low Trip Point are assigned to each setpoint. If the pressure in the vacuum system is higher than the defined High Trip Point threshold, the corresponding LED (<SP1> or <SP2>) is lit and the corresponding relay is closed. If the pressure in the vacuum system is lower than the defined Low Trip Point threshold, the corresponding LED (<SP1> or <SP2>) is lit and the corresponding relay is closed.

Measurement signal
(Pressure p)



The setpoints can only be programmed via

- the diagnostic port (→ [2])
- the serial interface (→ [2], [3]).



4.3.1 Adjusting the Setpoints SP1, SP2



The switching characteristics and the hysteresis can only be programmed via

- the diagnostic port (→ [2])
- the serial interface (→ [2], [3]).



The thresholds of the setpoints can be adjusted via

- the buttons on the gauge
- the diagnostic port (→ [2])
- the serial interface (→ [2], [3]).



If both a High Trip Point and a Low Trip Point are assigned to a setpoint, Low Trip Point only can be adjusted via the corresponding button on the gauge.



DANGER



DANGER: malfunction

If processes are controlled via the signal output, keep in mind that by pushing an <SP> button the measurement signal is suppressed and the corresponding threshold value is output instead. This can cause malfunctions.

Push the <SP> button only if you are sure that no damages can arise from a malfunction.

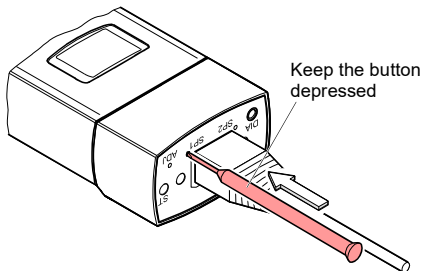
Adjusting setpoint SP1 with button on the gauge

1

Push the <SP1> button with a pin (max. $\varnothing 1.1$ mm). The gauge changes to the switching function mode and outputs the current threshold value at the measurement value output or on the LCD for about 5 s and the corresponding <S> on the display blinks.

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The threshold setting is increased towards the upper limit until the button is released or the limit is reached. If the button is briefly released and pushed again, the threshold setting starts changing in the reverse direction.



The factory setting of the upper threshold is 10% above the Low Trip Point and 10% below the High Trip Point (hysteresis).



If after programming of the hysteresis the corresponding button <SP1> or <SP2> is pushed, the factory setting of the corresponding hysteresis (10%) is reactivated.

2

Release the button. The gauge resumes operation after 5 s and at the current pressure value is available at the measurement signal output.




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Programming setpoint SP1

Programmable parameters: Low Trip Point
(→  [2], [3]) Low Trip Enable
 Low Trip Point Hysteresis
 High Trip Point
 High Trip Enable
 High Trip Point Hysteresis
 Setpoint Mode

Adjusting setpoint SP2

The adjustment procedure is the same as for setpoint SP1.

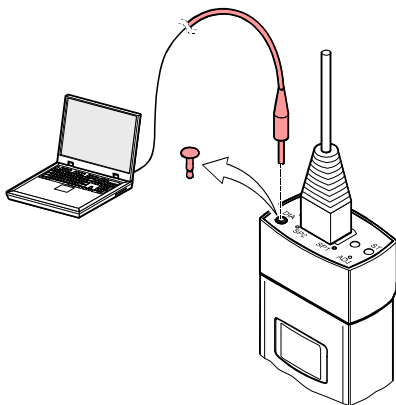


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4.4 Diagnostic Port (RS232C Interface)

The diagnostic port <DIA> permits to output the pressure reading and all status information and to enter all settings at the same time (→ [2]).



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4.5 Profibus Operation



Caution



Caution: data transmission errors

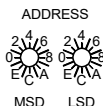
The attempt to operate the gauge with the RS232C interface causes data transmission errors.

This gauge must not be operated with the RS232C interface.

For operating the gauge via Profibus, prior installation of the device specific GSD file is required on the bus master side. This file can be downloaded via internet.

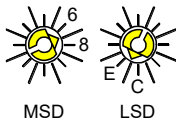
Node Address Setting

For unambiguous identification of the gauge in a Profibus environment, a node address is required. The node address setting is made on the gauge.



The node address (0 ... 125_{dec}) is set in hexadecimal form (00 ... 7D_{hex}) via the <ADDRESS>, <MSD>, and <LSD> switches. The node address is polled by the firmware when the gauge is switched on. If the setting deviates from the stored value, the new value is taken over into the NVRAM. If a value >7D_{hex} (>125_{dec}) is entered, the node address setting currently stored in the device remains valid but it can now be defined via Profibus ("Set slave Address", → [3]).

Default address setting is 5C_{hex}.



Example: Node address = 7D_{hex}:

5 Deinstallation



WARNING



WARNING: fragile components

The ceramic sensor may be damaged by impacts. Do not drop the product and prevent shocks and impacts.



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.



Caution



Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

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Caution

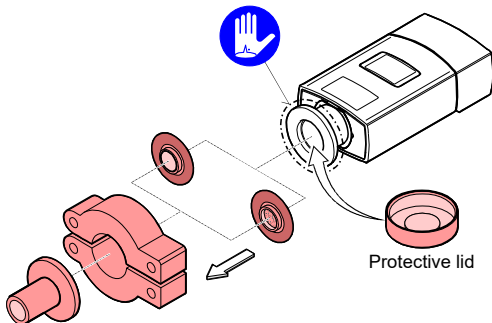


Caution: dirt sensitive area

Touching the product or parts thereof with bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.

- 1 Vent the vacuum system.
- 2 Put the gauge out of operation.
- 3 Untighten the fastening screw(s) and disconnect the sensor cable.
- 4 Remove gauge from the vacuum system and install the protective lid.



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6 Maintenance, Repair



Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. seals, filament), are not covered by the warranty.

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

6.1 Adjusting the Gauge

The gauge is factory calibrated. Due to long time operation or contamination, a zero drift could occur. Periodically check the zero and adjust it if necessary.

For adjusting the zero, operate the gauge under the same constant ambient conditions and in the same mounting orientation as normally.

The gauge is adjusted to default values. However, it can also be adjusted to other pressure values, if the exact pressure value is known (reference measurement).

- 1** If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary (→ "Deinstallation").
- 2** Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes.

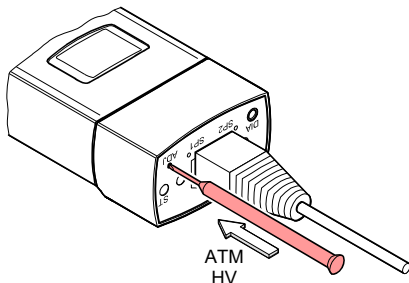


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Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

- 3** Press the <ADJ> button with a pin (max. $\varnothing 1.1$ mm) and the ATM adjustment is carried out: The gauge is adjusted to 1000 mbar by default. By pressing the button >5 s the pressure value is increased towards 1200 mbar (or, by pressing it again, decreased towards 500 mbar) until the button is released or the limit is reached.



- 4** Evacuate the vacuum system to $p \ll 10^{-5}$ mbar and wait at least 2 minutes.
- 5** Press the <ADJ> button with a pin and the HV adjustment is carried out: The gauge is adjusted to 5×10^{-5} mbar (default).

✓ If the pressure value 4.99×10^{-5} mbar is output at the measurement value output or on the LCD, the adjustment has been successful. Otherwise, repeat the adjustment procedure.



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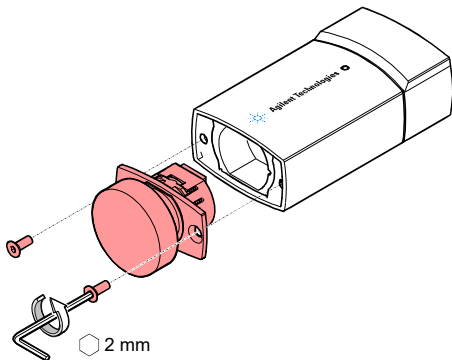
6.2 Replacing the Sensor

In case of severe contamination or a malfunction, the sensor can be replaced.

Precondition

Gauge deinstalled (→ 39).

- 1 Unscrew the hexagon socket screws and remove the sensor without twisting it.



- 2 Place the new sensor without twisting it and lock it with the screws.



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6.3 Troubleshooting



In case of an error, it may be helpful to just turn off the mains supply and turn it on again after 5 s.

Problem	Possible cause	Correction
Output signal permanently $\approx 0V$	Sensor cable defective or not correctly connected	Check the sensor cable
	No supply voltage	Turn on the power supply
	Error	Remedy the error
	Gauge in an undefined status	Turn the gauge off and on again after 5 s (reset)
FAIL PIR1	Pirani sensor defective	Replace the sensor (→ 43)
	Electronics unit not correctly mounted on sensor	Check the connections (electronics – sensor)
FAIL CAP1	Diaphragm sensor defective	Replace the sensor (→ 43)
	Electronics unit not mounted correctly on sensor	Check the connections (electronics – sensor)
FAIL EEPROM	EEPROM error	Turn the gauge off and on again after 5 s (reset)
		Replace the gauge
FAIL SENSOR	Electronics unit not compatible with the sensor	Replace the sensor (→ 43)
		Replace the gauge



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7 Returning the Product



WARNING

WARNING: forwarding contaminated products
Contaminated products (e.g. radioactive, toxic, caustic or microbiological hazard) can be detrimental to health and environment.

Products returned to Agilent should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly completed declaration of contamination.

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer. Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.



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8 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.

9 Spare Parts

When ordering spare parts, always indicate:






- all information on the product nameplate
- description and ordering number

Sensor for gauges with tungsten (W) filament		Ordering No.	
PCG-750	PCG750CF16	DN 16 CF-F	PCG750CF17RS
	PCG750CF16SD1		
	PCG750CF16SD2		
	PCG750CF16SD3		
	PCG750CF16SP		
	PCG750KF16	DN 16 ISO-KF	PCG750KF17RS
	PCG750KF16SD1		
	PCG750KF16SD2		
	PCG750KF16SD3		
	PCG750KF16SP		

Sensor for gauges with nickel (Ni) filament		Ordering No.	
PCG-752	PCG752CF16	DN 16 CF-F	PCG752CF17RS
	PCG752CF16SD1		
	PCG752CF16SD2		
	PCG752CF16SD3		
	PCG752CF16SP		
	PCG752KF16	DN 16 ISO-KF	PCG752KF17RS
	PCG752KF16SD1		
	PCG752KF16SD2		
	PCG752KF16SD3		
	PCG752KF16SP		



Further Information

-  [1] www.agilent.com
Operating Manual
AGC-100 Vacuum Gauge Controller
tqnb15e1
Agilent Technologies, Lexington, MA 02421, USA
-  [2] www.agilent.com
Communication Protocol
Serial Interface RS232C
PCG-75x, PVG-55x
tqra78e1
Agilent Technologies, Lexington, MA 02421, USA
-  [3] www.agilent.com
Communication Protocol
Profibus PCG-75x, PVG-55x
tqra77e1
Agilent Technologies, Lexington, MA 02421, USA
-  [4] IEC 61158 Type 3 elements: Industrial communication networks – Fieldbus specifications
IEC 61784: Industrial communication networks – Fieldbus profiles
-  [5] www.profibus.com
Profibus user organization



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Notes



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Pirani Capacitance Diaphragm Gauge PCG-750 PCG-752

Notes



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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-care@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>





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: <input type="checkbox"/> Taxable <input type="checkbox"/> 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:** _____



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
<ul style="list-style-type: none"> Does not start Does not spin freely Does not reach full speed Mechanical Contact Cooling defective 	<ul style="list-style-type: none"> Noise Vibrations Leak Overtemperature Clogging 	<ul style="list-style-type: none"> Vertical Horizontal Upside down Other:
		Power: Rotational Speed: Current: Inlet Pressure: Temp 1: Foreline Pressure: Temp 2: Purge flow: OPERATING TIME:

ION PUMPS/CONTROLLERS

<ul style="list-style-type: none"> Bad feedthrough Vacuum leak Error code on display 	<ul style="list-style-type: none"> Poor vacuum High voltage problem Other
---	--

VALVES/COMPONENTS

<ul style="list-style-type: none"> Main seal leak Solenoid failure Damaged sealing area 	<ul style="list-style-type: none"> Bellows leak Damaged flange Other
--	---

LEAK DETECTORS

<ul style="list-style-type: none"> Cannot calibrate Vacuum system unstable Failed to start 	<ul style="list-style-type: none"> No zero/high background Cannot reach test mode Other
---	--

INSTRUMENTS

<ul style="list-style-type: none"> Gauge tube not working Communication failure Error code on display 	<ul style="list-style-type: none"> Display problem Degas not working Other
--	---

SCROLL AND ROTARY VANE PUMPS

<ul style="list-style-type: none"> Pump doesn't start Doesn't reach vacuum Pump seized 	<ul style="list-style-type: none"> Noisy pump (describe) Over temperature Other
---	--

DIFFUSION PUMPS

<ul style="list-style-type: none"> Heater failure Doesn't reach vacuum Vacuum leak 	<ul style="list-style-type: none"> 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.

Service & Support

North America

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121 Hartwell Avenue
Lexington, MA 02421 USA
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Toll-Free: +1 800 882 7426
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vpl-customerservice@agilent.com

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Herculesweg 8
4338 PL Middelburg The Netherlands
Tel: +31 118 671570
Fax: +31 118 671569
Toll free: 00 800 234 234 00

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Chao Yang District, Beijing,
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Toll-Free: 080 222 2452
Fax: +82 2 3452 2451
vpk-customerservice@agilent.com

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Fax: +65 6754 0574
Toll-Free: 1 800 2762622
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vpt-customerservice@agilent.com



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