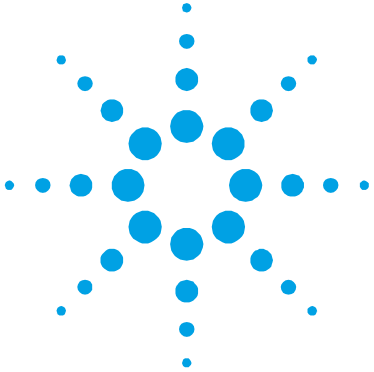

Vaclon Plus 1000

Models
X3604-64000, X3604-64020

Manuale di Istruzioni
Bedienungshandbuch
Notice de Mode D'Emploi
Instruction Manual

87-900-152-01 (A)
10/2017

Agilent Technologies

Notices

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Via F.lli Varian, 54

10040 Leini (TO)

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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.

Vaclon Plus 1000

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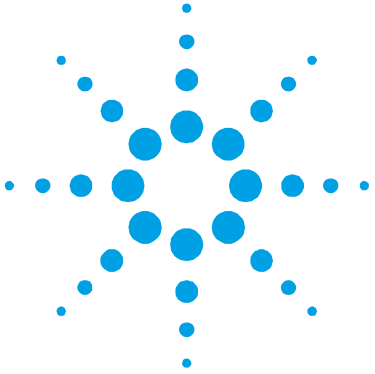

1 Procedura per l'installazione

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Traduzione delle istruzioni originali

Informazioni Generali

Questa apparecchiatura è destinata ad uso professionale. L'utilizzatore deve leggere attentamente il presente manuale di istruzioni ed ogni altra informazione addizionale fornita da Agilent prima dell'utilizzo dell'apparecchiatura. Agilent si ritiene sollevata da eventuali responsabilità dovute all'inosservanza totale o parziale delle istruzioni, ad uso improprio da parte di personale non addestrato, ad interventi non autorizzati o ad uso contrario alle normative nazionali specifiche.

Le pompe della serie VacIon Plus sono pompe ioniche utilizzate comunemente per applicazioni di ultra alto vuoto, grazie alla loro pulizia, capacità di pompare qualsiasi tipo di gas, e del loro funzionamento senza vibrazioni e necessità di manutenzione.

Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Informazioni dettagliate sono fornite nell'appendice "Technical information".

Questo manuale utilizza le seguenti convenzioni:

AVVERTENZA! **I messaggi di avvertenza attirano l'attenzione dell'operatore su una procedura o una pratica specifica che, se non eseguita in modo corretto, potrebbe provocare gravi lesioni personali.**

ATTENZIONE! I messaggi di attenzione sono visualizzati prima di procedure che, se non osservate, potrebbero causare danni all'apparecchiatura.

NOTA Le note contengono informazioni importanti estrapolate dal testo.

Simboli di sicurezza

SIMBOLO	DESCRIZIONE DEI SIMBOLI
	Vietato l'accesso ai portatori di stimolatori cardiaci attivi. L'apparato è contrassegnato da questo simbolo per segnalare che i portatori di stimolatori cardiaci attivi non devono entrare in contatto con l'apparato stesso.
	Pericolo elettricità. L'apparato è contrassegnato da questo simbolo quando l'operatore, in presenza di alta tensione, deve fare riferimento al manuale di istruzioni al fine di proteggersi dai rischi di folgorazione.
	Pericolo campo magnetico. L'apparato è contrassegnato da questo simbolo per segnalare all'operatore la presenza di un campo magnetico.
	Pericolo superficie calda. L'apparato è contrassegnato da questo simbolo quando l'operatore deve evitare il contatto con superfici potenzialmente calde che potrebbero causare ustioni.

Immagazzinamento

Per trasportare ed immagazzinare la pompa ionica occorre osservare le seguenti condizioni ambientali:

- Temperatura: da -20 °C a +70 °C;
- Umidità relativa: da 5 a 95% (senza condensa).

Preparazione per l'installazione

La pompa viene fornita in un imballo protettivo speciale; se si presentano segni di danni, che potrebbero essersi verificati durante il trasporto, contattare l'ufficio vendite locale. Durante l'operazione di disimballaggio, prestare particolare attenzione a non lasciar cadere la pompa e a non sottoporla ad urti o vibrazioni. Non disperdere l'imballo nell'ambiente. Il materiale è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

ATTENZIONE! Onde evitare problemi di contaminazione e conseguente degassamento, non toccare con le mani nude i componenti destinati ad essere esposti al vuoto. Utilizzare sempre guanti da alto vuoto o altra protezione adeguata.

NOTA La pompa non può essere danneggiata rimanendo semplicemente esposta all'atmosfera. Si consiglia comunque di mantenerla chiusa fino al momento dell'installazione sul sistema onde evitare eventuale inquinamento da polvere.

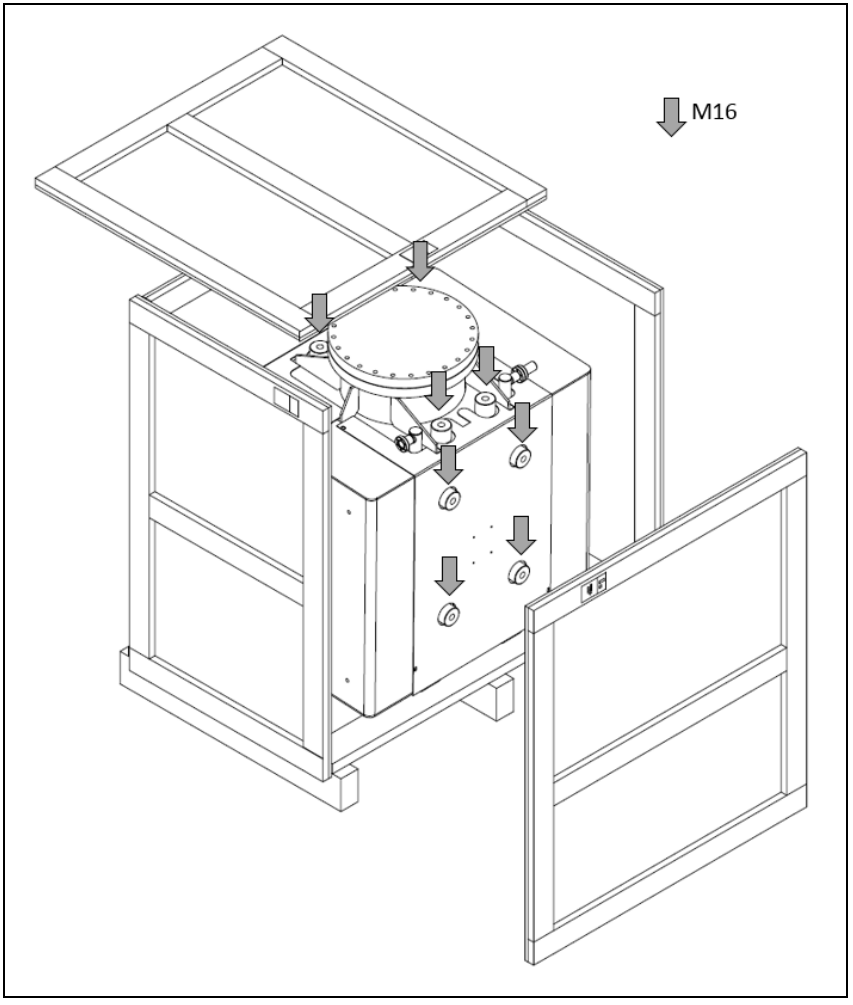


Figura 1 Imballaggio della pompa VacIon Plus 1000.

Installazione

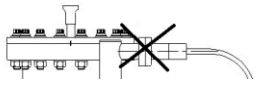
AVVERTENZA!

La pompa, a causa del suo peso, deve essere maneggiata tramite appositi attrezzi di sollevamento e spostamento. In fase di movimentazione si raccomanda sempre l'utilizzo contemporaneo di quattro golfari (filettatura M16).

Non installare e/o utilizzare la pompa in ambienti esposti ad agenti atmosferici (pioggia, gelo, neve), polveri, gas aggressivi, in ambienti esplosivi o con elevato rischio di incendio. Durante il funzionamento, per ottenere le specifiche tecniche dichiarate, la temperatura ambiente deve essere compresa tra 0 °C e +85 °C e l'umidità tra 0% e 95% (senza condensa).

ATTENZIONE! La pompa deve essere tenuta sigillata con il suo tubo di ingresso schiacciato ("pinch-off") finché non è pronta per essere collegata al sistema.

AVVERTENZA!



Per evitare lesioni alla persona, non collegare l'alta tensione alla pompa prima che sia installata nel sistema e che tutte le flange di ingresso siano adeguatamente collegate o chiuse.

Il funzionamento delle pompe è ottimizzato solo con l'uso delle apposite unità di controllo Agilent.

ATTENZIONE! Il rispetto delle normative di sicurezza nell'uso delle pompe è garantito solo con l'uso delle unità di controllo Agilent.

AVVERTENZA!

Per installazioni in verticale in cui la pompa non venga appoggiata alla base o per installazioni in posizione diversa dalla verticale, la pompa, dato il suo peso, deve essere opportunamente sostenuta tramite dei supporti. Si raccomanda l'utilizzo contemporaneo di quattro punti di aggancio.

La pompa VacIon Plus 1000 può essere installata in qualsiasi posizione, se opportunamente sostenuta. Per convenienza normalmente viene montata in posizione verticale con la flangia di ingresso in alto. utilizzando come base di appoggio le staffe presenti sotto la pompa. Per installazioni in verticale in cui la pompa non venga appoggiata alla base o per installazioni in posizione diversa dalla verticale, la pompa, dato il suo peso, non può essere montata a sbalzo, ma deve essere opportunamente sostenuta tramite dei supporti (sbarre o piastre di sostegno, la cui geometria dipende dal tipo di sistema su cui la pompa viene montata). Tali supporti possono essere agganciati alla pompa tramite i nottolini (con filettatura M16) presenti su entrambi i lati della pompa. Si raccomanda di utilizzare sempre quattro punti di aggancio contemporaneamente.

Per informazioni dettagliate sull'installazione della pompa, vedere l'appendice "Technical Information".

Uso

Tutte le istruzioni per il corretto funzionamento delle pompe VacIon Plus sono contenute nel manuale dell'unità di controllo. Leggere attentamente tale manuale prima dell'utilizzo.

Si raccomanda di portare la pompa ad una pressione uguale o minore di 1E-5 Torr (mbar) per la versione Diode - 1E-4 Torr (mbar) per la versione StarCell - in modo da ottenere un avvio più rapido e prolungare la vita della pompa. Tipicamente questo livello di pressione può facilmente essere raggiunto per mezzo di una pompa turbomolecolare, supportata da una pompa primaria, possibilmente non lubrificata con olio, al fine di evitare rischi di contaminazione legati ai vapori di olio.

In linea di principio la pompa ionica può essere avviata anche a pressioni superiori a quella da noi raccomandata, ma questa pratica, se protratta nel tempo, può ridurre il tempo di vita della pompa. In passato la necessità di avviare la pompa ionica ad alta pressione era legata al bisogno di collegarla direttamente alla pompa primaria; con l'avvento delle pompe turbomolecolari tale necessità è venuta meno.

Depositi igroscopici, che sono naturale conseguenza dell'esposizione della pompa all'aria, e l'assorbimento di idrogeno all'interno dei catodi di titanio, fenomeno connesso al principio fisico di funzionamento della pompa, possono nel tempo provocare l'allungamento del tempo di avvio. Infatti il riscaldamento della pompa che si verifica al suo avvio provoca il rilascio del vapore acqueo e di parte dell'idrogeno pompato precedentemente, rendendo la partenza più lunga.

Procedure di uso

1. Controllare che la polarità dell'unità di controllo sia corretta per la pompa: polarità positiva per le pompe Diode e negativa per le StarCell. A tale scopo fare riferimento al relativo manuale del controller. Osservare la seguente procedura per l'uso della pompa: tramite una pompa turbomolecolare di pre-vuoto (supportata da una pompa primaria) portare il sistema da vuoto ad una pressione minima di avvio in accordo alla tabella 1. Si raccomanda di installare una valvola a chiusura metallica tra la pompa ionica e la pompa turbomolecolare, in modo da poter successivamente escludere quest'ultima.
2. Collegare l'unità di controllo della pompa ad una apposita fonte di alimentazione ed accendere l'unità. Seguendo le istruzioni sul manuale dell'unità di controllo alimentare la pompa ionica.
3. Osservare la tensione, la corrente e la pressione sul display dell'unità di controllo. Se l'avvio è avvenuto ad una pressione troppo alta, tipicamente la tensione si attesterà su qualche centinaia di Volt. Se la tensione rimane costante intorno a suddetti valori, per evitare il surriscaldamento della pompa si raccomanda di spegnerla, attendere e di avviarla nuovamente ad una pressione inferiore (vedere il paragrafo "Uso"). Si prega di notare che un valore di corrente prossimo alla corrente di corto circuito dell'unità di controllo è indice dell'esistenza di una perdita nella pompa e nel sistema. Inoltre un temporaneo incremento della pressione di pre-vuoto è normale durante la fase di avvio.
   Se la pompa ionica è stata avviata alla pressione suggerita (vedere la tabella 1), la tensione raggiungerà in breve tempo il valore pre-impostato sull'unità di controllo (3, 5 o 7 kV). Una volta raggiunta la tensione operativa, la corrente inizierà a scendere. Si raccomanda a questo punto di chiudere la valvola di pre-vuoto, in modo da isolare la pompa ionica e il sistema dalla pompa turbomolecolare. Se la tensione della pompa ionica scende dopo la chiusura della valvola, riaprirla quest'ultima per un pre-pompaggio aggiuntivo. Appena la pressione diminuisce, la tensione cresce nuovamente e la valvola di pre-vuoto può essere chiusa.
4. Quando la tensione ha raggiunto il valore operativo pre-impostato, mettere l'unità di controllo nello stato PROTECT, se l'unità di controllo possiede questa predisposizione. Il sistema sarà così autoprotetto dall'incremento della pressione oltre il valore pre-impostato. Nel caso in cui ci fosse un tale incremento, l'unità di controllo viene spenta automaticamente.

5 Se l'unità di controllo consente di impostare il tipo di pompa in utilizzo, sul display comparirà anche il valore di pressione ottenuto dalla conversione della corrente, in accordo con il diagramma pressione-corrente illustrato nel paragrafo "Technical Information" di questo manuale. Se l'unità di controllo non possiede questa predisposizione fare riferimento direttamente a tale diagramma. Ricordiamo che l'indicazione della pressione potrebbe non essere corretta nel caso in cui, durante il suo utilizzo, la pompa ionica sviluppi una corrente di dispersione. In tal caso la pressione risultante dalla conversione sarà maggiore di quella reale.

6 Quando si porta la pompa alla pressione atmosferica, usare azoto secco in modo da evitare l'assorbimento di vapore acqueo da parte delle pareti della pompa. Si raccomanda, una volta spenta la pompa, di attendere il raffreddamento degli elementi al suo interno prima di procedere con l'esposizione alla pressione atmosferica.

AVVERTENZA!

Quando la pompa viene utilizzata per il pompaggio di gas tossici, infiammabili o radioattivi, seguire le appropriate procedure tipiche di ciascun gas. Non usare la pompa in presenza di gas esplosivi.

AVVERTENZA!

Quando è installato il riscaldatore, non toccare la pompa durante le operazioni di riscaldamento e di raffreddamento. L'elevata temperatura può causare lesioni alle persone.

ATTENZIONE! Non avvicinare dispositivi elettronici alla pompa. Il campo magnetico attorno ad essa può provocare dei malfunzionamenti dei dispositivi stessi.

Manutenzione

Le pompe della serie VacIon Plus non richiedono alcuna manutenzione. Qualsiasi intervento deve essere eseguito da personale autorizzato.

AVVERTENZA! **Prima di effettuare qualsiasi intervento sulla pompa scollegarla dall'alta tensione.**

Qualora una pompa dovesse essere rottamata, procedere alla sua eliminazione nel rispetto delle normative nazionali specifiche.

Smaltimento

Significato del logo "WEEE" presente sulle etichette.

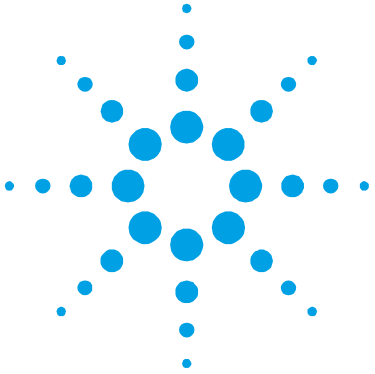
Il simbolo qui sotto riportato applicato in ottemperanza alla direttiva CE denominata "WEEE".

Questo simbolo (**valido solo per i paesi della Comunità Europea**) indica che il prodotto sul quale è applicato, NON deve essere smaltito insieme ai comuni rifiuti domestici o industriali, ma deve essere avviato ad un sistema di raccolta differenziata.

Si invita pertanto l'utente finale a contattare il fornitore del dispositivo, sia esso la casa madre o un rivenditore, per avviare il processo di raccolta e smaltimento, dopo opportuna verifica dei termini e condizioni contrattuali di vendita.

Per maggiori informazioni riferirsi a:

http://www.agilent.com/environment/product/index.shtml



2
Anleitung zur Installation

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Übersetzung der Originalanleitungen

Allgemeine Hinweise

Dieses Gerät ist für den professionellen Gebrauch bestimmt. Vor dem Gebrauch soll der Benutzer dieses Handbuch sowie alle weiteren von Agilent mitgelieferten Zusatzdokumentationen genau lesen. Bei vollständiger bzw. teilweiser Nichtbeachtung der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Mißachtung der nationalen Bestimmungen übernimmt Firma Agilent keinerlei Haftung.

Die Pumpen der Serie VacIon Plus sind Ionenpumpen, die aufgrund ihrer Reinheit, ihrer Fähigkeit, alle Arten von Gas zu pumpen, und ihres vibrations- und wartungsfreien Betriebes, allgemein für Ultrahochvakuumanwendungen zum Einsatz kommen.

In den folgenden Abschnitten sind alle erforderlichen Informationen für die Sicherheit des Bedieners bei der Anwendung des Geräts aufgeführt. Detaillierte technische Informationen sind im Anhang "Technical Information" enthalten.

In dieser Gebrauchsanleitung werden Sicherheitshinweise folgendermaßen hervorgehoben:

WARNUNG!

Die Warnhinweise lenken die Aufmerksamkeit des Bedieners auf eine spezielle Prozedur oder Praktik, die bei unkorrekter Ausführung schwere Verletzungen hervorrufen könnte.

VORSICHT! Die Vorsichtshinweise vor bestimmten Prozeduren machen den Bediener darauf aufmerksam, daß bei Nichteinhaltung Schäden am Gerät entstehen können.

HINWEIS Die Hinweise enthalten wichtige Informationen, die aus dem Text hervorgehoben werden.

Sicherheits-Symbole

SYMBOL	ERKLÄRUNG DER SYMBOLE
	Zutritt für Personen mit Herzschrittmachern verboten. Das Gerät ist mit diesem Symbol versehen, um darauf hinzuweisen, dass Personen mit Herzschrittmachern nicht mit dem Gerät in Kontakt geraten dürfen.
	Gefahr von Stromschlägen Wenn das Gerät mit diesem Symbol versehen ist, muss das Bedienungspersonal im Fall von Hochspannung im Handbuch nachschlagen, um die richtigen Schutzmaßnahmen gegen Stromschläge zu ergreifen.
	Gefahr durch Magnetfelder. Das Gerät ist mit diesem Symbol versehen, um das Bedienungspersonal darauf hinzuweisen, dass ein Magnetfeld vorliegt.
	Gefahr durch heiße Oberflächen. Das Gerät ist mit diesem Symbol versehen, um das Bedienungspersonal vor dem Kontakt mit möglicherweise heißen Oberflächen zu warnen, die Verbrennungen verursachen können.

Lagerung

Für Transport und Lagerung der Ionenpumpe sind die folgenden Umgebungsbedingungen herzustellen

- Temperatur: -20 °C bis +70 °C;
- Relative Luftfeuchtigkeit: 5 bis 95% (ohne Kondenswasser).

Vor der Installation

Die Pumpe wird in einer speziellen Schutzverpackung geliefert. Eventuelle Transportschäden sind der zuständigen örtlichen Verkaufsstelle zu melden. Beim Auspacken vorsichtig vorgehen, damit die Pumpe nicht fällt oder Stößen oder Vibrationen ausgesetzt wird. Das Verpackungsmaterial ist ordnungsgemäß zu entsorgen. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für den Umweltschutz.

VORSICHT! Um Entgasungsprobleme zu vermeiden, dürfen die Komponenten, die mit dem Vakuum in Kontakt kommen, nicht mit bloßen Händen berührt werden. Verwenden Sie geeignete Sicherheitshandschuhe oder andere Schutzvorrichtungen.

HINWEIS Die Pumpe kann, wenn sie einfach der Atmosphäre ausgesetzt ist, nicht beschädigt werden. Sie sollte jedoch bis zur Installation an der Anlage geschlossen bleiben, um Verunreinigungen durch Staub zu vermeiden.

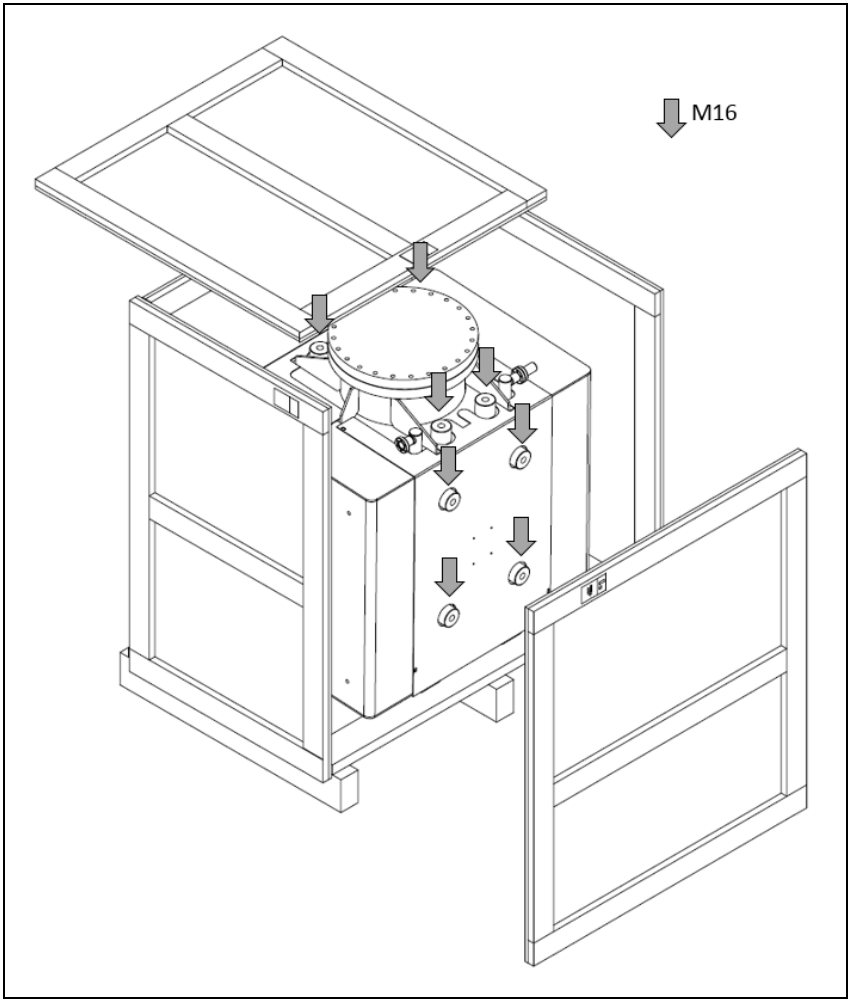


Abbildung 1 Verpackung der Pumpe Vaclon Plus 1000.

Installation

WARNUNG!

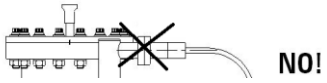
Die Pumpe kann aufgrund ihres Gewichtes mittels geeigneter Hebe- und Förderzeuge gehandhabt werden. Für die Bewegung wird die Verwendung von vier Haken (Gewinde M16 empfohlen).

Die Pumpe darf nicht in Umgebungen installiert und/oder benutzt werden, die ungeschützt vor Witterungsbedingungen (Regen, Frost, Schnee), Staub und aggressiven Gasen sind, und in denen Explosions- und erhöhte Brandgefahr besteht. Während des Betriebes soll die Umgebungstemperatur zwischen 0 °C und +85 °C betragen und die Luftfeuchtigkeit zwischen 0% und 95% liegen (ohne Kondenswasser), um die angegebenen technischen Merkmale zu gewährleisten.

VORSICHT!

Die Pumpe soll versiegelt und mit flachgedrücktem Eintrittsschlauch gehalten werden („pinch-off"), bis sie für den Anschluß an das System bereit ist.

WARNUNG!



Um Personenschäden zu vermeiden, darf die Hochspannungsleitung der Pumpe erst angeschlossen werden, wenn die Pumpe im System installiert ist und alle Eintrittsflansche entsprechend angeschlossen oder geschlossen sind.

Der Pumpenbetrieb wird nur durch den Einsatz speziell dafür vorgesehener Agilent Steuereinheiten optimiert.

VORSICHT! Die Einhaltung der Sicherheitsvorschriften beim Gebrauch der Pumpen ist nur bei Verwendung von Agilent Steuereinheiten gewährleistet.

WARNUNG!

Für vertikale Installationen, bei der die Pumpe nicht auf die Basis gesetzt wird, oder in anderen als vertikalen Positionen muss die Pumpe aufgrund ihres hohen Gewichts mit Halterungen versehen werden. Es empfiehlt sich die gleichzeitige Verwendung von vier Haltepunkten.

Die Pumpe VacIon Plus 1000 kann in jeder Position installiert werden, wenn sie richtig gehalten wird. Aus praktischen Gründen wird sie in der Regel senkrecht mit nach oben gerichtetem Eintrittsflansch montiert. Dabei werden die Bügel unter der Pumpe als Basis verwendet. Bei vertikalen Installationen, in denen die Pumpe nicht auf die Basis gestützt wird, oder bei anderen Installationen als in der Vertikalen darf die Pumpe wegen ihres Gewichts nicht im Überhang montiert werden, sondern muss auf geeignete Weise mit Halterungen versehen werden (Stäbe oder Platten, deren Geometrie vom System abhängt, mit dem die Pumpe verbunden wird). Diese Halterungen können mit Sperrklinken (mit M16-Gewinde) befestigt werden, die an beiden Seiten der Pumpe sitzen. Es empfiehlt sich die gleichzeitige Benutzung von vier Haltepunkten.

Detaillierte Informationen zur Installation der Pumpe sind dem Anhang “Technical Information” zu entnehmen.

Gebrauch

Sämtliche Hinweise für den korrekten Betrieb der Pumpen VacIon Plus sind im Handbuch der Steuereinheit enthalten. Dieses Handbuch ist vor der Inbetriebnahme genau durchzulesen.

Es wird empfohlen, für das Modell Diode einen Druck von 1E-5 Torr (mbar) oder weniger einzustellen und für das Modell StarCell einen Druck von 1E-4 Torr (mbar) oder weniger. Auf diese Weise startet die Pumpe schneller und hält auch länger. Üblicherweise kann dieser Druck von einer turbomolekularen Pumpe mit Unterstützung einer Primärpumpe leicht erreicht werden. Diese sollte am bestens eine ölfreie Pumpe sein, um Kontamination durch Öldämpfe zu verhindern.

Grundsätzich kann eine Ionenpumpe auch mit höheren als den empfohlenen Drücken gestartet werden, allerdings kann sich dabei auf Dauer die Lebensdauer der Pumpe verringern. Früher musste eine Hochdruck-Ionenpumpe direkt an eine Primärpumpe angeschlossen werden. Seit es turbomolekulare Pumpen gibt, ist das nicht mehr unbedingt notwendig.

Hygroskopische Ablagerungen sind eine normale Begleiterscheinung des Betriebs der Pumpe an der Luft und der Absorption von Wasserstoff in den Titankathoden. Das hängt mit dem physikalischen Funktionsprinzip der Pumpe zusammen. Diese Ablagerungen können mit der Zeit dazu führen, dass die Startzeit sich verlängert, weil das Aufheizen der Pumpe beim Start dazu führt, dass Wasserdampf und ein Teil des vorher gepumpten Wasserstoffes freiwird.

Bedienungsschritte

1. Es ist zu kontrollieren, daß die Steuereinheit in bezug auf die Pumpe richtig gepolt ist: positive Polarität für die Pumpenmodelle Diode und negative für das Modell StarCell. Schlagen Sie dazu im Handbuch des Controllers nach. Halten Sie sich beim Betrieb der Pumpe an den folgenden Ablauf: bringen Sie das Vakuumsystem mit einer Turbomolekularpumpe mit Vor-Vakuum (unterstützt von einer Primärpumpe) auf den Mindest-Startdruck gemäß der Tabelle 1. Es wird empfohlen, ein Ventil mit metallischem Verschluss zwischen Ionenpumpe und Turbomolekularpumpe zu setzen, so dass letztere später abgestellt werden kann.
2. Schließen Sie die Kontrolleinheit für die Pumpe an eine geeignete Stromquelle an und schalten Sie die Einheit ein. Halten Sie sich an die Instruktionen des Handbuches der Kontrolleinheit für die Stromversorgung der Ionenpumpe.
3. Überwachen Sie Spannung, Stromstärke und Druck auf dem Display der Kontrolleinheit. Wenn der Start bei zu hohem Druck erfolgt ist, liegt die Spannung üblicherweise bei einigen Hundert Volt. Wenn die Spannung konstant in der Größenordnung der genannten Werte bleibt, wird empfohlen, die Pumpe abzuschalten, damit sie sich nicht überhitzt. Danach sollte einige Zeit gewartet werden, bevor die Pumpe bei geringerem Druck erneut eingeschaltet wird (siehe Abschnitt “Betrieb”). Beachten Sie bitte, dass eine Stromstärke, die in der Nähe der Kurzschlussstromstärke der Kontrolleinheit liegt, auf eine undichte Stelle in der Pumpe und im System hindeutet. Eine Erhöhung des Drucks für das Vor-Vakuum ist dagegen in der Startphase normal.
   Wenn die Ionenpumpe mit dem empfohlenen Druck gestartet wurde (siehe Tabelle 1), erreicht die Spannung in kurzer Zeit den auf der Kontrolleinheit eingestellten Wert (3, 5 oder 7 kV). Wenn die Betriebsspannung erreicht ist, beginnt die Stromstärke zu sinken. Jetzt sollte das Ventil für das Vor-Vakuum geschlossen werden, so dass die Ionenpumpe und das System von der Turbomolekularpumpe getrennt ist. Wenn die Spannung der Ionenpumpe nach dem Schließen des Ventils absinkt, öffnen Sie das Ventil noch einmal für ein zusätzliches Vorpumpen. Sobald der Druck abnimmt, steigt die Spannung erneut und das Ventil für das Vor-Vakuum kann geschlossen werden.
4. Wenn die Spannung den voreingestellten Betriebswert erreicht hat, schalten Sie die Kontrolleinheit in den Status PROTECT, wenn die Kontrolleinheit dafür vorgesehen ist. Das System schützt sich dann selbst vor einem Druckanstieg über den voreingestellten Wert hinaus. Wenn es zu einem Druckanstieg kommt, wird die Kontrolleinheit automatisch abgeschaltet.

5 Wenn die Kontrolleinheit die Einstellung der verwendeten Pumpe erlaubt, erscheint auf dem Display auch der Druckwert, der sich aus der Stromumwandlung ergibt, entsprechend dem Druck-Strom-Diagramm, das im Abschnitt “Technische Informationen” dieses Handbuchs wiedergegeben ist. Wenn die Kontrolleinheit eine solche Einstellung nicht ermöglicht, halten Sie sich direkt an das Diagramm. Wir erinnern noch einmal daran, dass die Druckangabe möglicherweise nicht korrekt sein könnte, wenn während des Betriebs an der Ionenpumpe ein Fehlerstrom auftritt. In diesem Fall ist der Druck, der sich aus der Umwandlung ergibt, stärker als der reale Druck.

6 Wenn die Pumpe auf den atmosphärischen Druck zu bringen ist, verwenden Sie trockenen Stickstoff, um die Absorption von Wasserdampf an den Pumpenwänden zu verhindern. Es wird empfohlen, nach dem Abschalten der Pumpe abzuwarten, bis die innen liegenden Komponenten sich abgekühlt haben, bevor sie dem atmosphärischen Druck ausgesetzt wird.

WARNUNG!

Wenn die Pumpe zur Förderung von giftigen, leicht entflammbaren oder radioaktiven Gasen benutzt wird, sind die für das jeweilige Gas vorgeschriebenen Vorgänge zu befolgen. Die Pumpe nie bei Vorhandensein von explosivem Gas benutzen.

WARNUNG!

Wenn der Heizer installiert ist, darf die Pumpe während der Aufheizung und Abkühlung nicht berührt werden. Die hohe Temperatur kann zu Personenschäden führen.

VORSICHT! Keine elektronischen Geräte in die Nähe der Pumpe bringen. Das darum befindliche Magnetfeld kann zu Funktionsstörungen der Geräte führen.

Wartung

Die Pumpen der Serie VacIon Plus erfordern keine Wartung. Sämtliche Eingriffe dürfen nur von autorisiertem Personal vorgenommen werden.

WARNUNG! **Vor Eingriffen an der Pumpe ist diese von der Hochspannungsquelle zu trennen.**

Bei eventueller Verschrottung einer Pumpe ist diese entsprechend der einschlägigen nationalen Vorschriften zu entsorgen.

Entsorgung

Bedeutung des "WEEE" Logos auf den Etiketten.

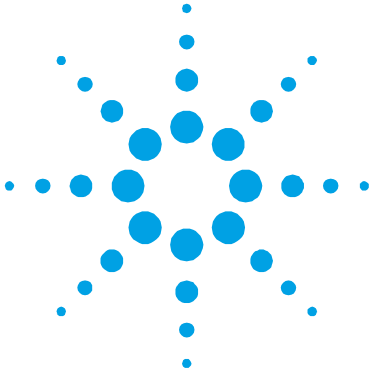
Das folgende Symbol ist in Übereinstimmung mit der EU-Richtlinie WEEE (Waste Electrical and Electronic Equipment) angebracht.

Dieses Symbol (**nur in den EU-Ländern gültig**) zeigt an, dass das betreffende Produkt nicht zusammen mit Haushaltsmüll entsorgt werden darf sondern einem speziellen Sammelsystem zugeführt werden muss.

Der Endabnehmer sollte daher den Lieferanten des Geräts - d.h. die Muttergesellschaft oder den Wiederverkäufer - kontaktieren, um den Entsorgungsprozess zu starten, nachdem er die Verkaufsbedingungen geprüft hat.

Für weitere Informationen:

http://www.agilent.com/environment/product/index.shtml



3 Procédure pour l'installation

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Traduction de la mode d'emploi originale

Indications Générales

Cet appareillage a été conçu en vue d'une utilisation professionnelle. Il est conseillé à l'utilisateur de lire attentivement cette notice d'instructions ainsi que toute autre indication supplémentaire fournie par Agilent avant d'utiliser l'appareil. Agilent décline toute responsabilité en cas de non respect total ou partiel des instructions fournies, d'opérations non autorisées, d'utilisation impropre par du personnel non formé ou contraires aux réglementations nationales spécifiques.

Grâce à leur propreté, à leur capacité de pomper tous les types de gaz, à leur fonctionnement sans vibrations et à l'absence d'entretien, les pompes de la série VacIon Plus sont des pompes ioniques généralement utilisées pour des applications de vide ultra poussé.

Les paragraphes suivants fournissent toutes les indications nécessaires à garantir la sécurité de l'opérateur pendant l'utilisation de l'appareil. Des informations plus détaillés sont disponibles à l'annexe "Technical Information".

Cette notice utilise les signes conventionnels suivants:

AVERTISSEMENT!

Les messages d'avertissement attirent l'attention de l'opérateur sur une procédure ou une manœuvre spéciale dont la mauvaise exécution risque de provoquer de graves lésions.

ATTENTION! Les messages d'attention apparaissent avant certaines procédures dont le non-respect peut endommager sérieusement l'appareillage.

NOTE Les notes contiennent des renseignements importants, extrapolés du texte.

Signaux de sécurité

SIGNAL	DESCRIPTION
	Accès interdit aux porteurs de stimulateur cardiaque actif. Ce signal a été apposé sur l'appareil pour aviser les porteurs de stimulateur cardiaque qu'ils ne doivent pas entrer en contact avec l'appareil.
	Danger électrique. Ce signal a été apposé sur l'appareil pour avertir l'opérateur de la présence de haute tension et l'inviter à se référer à la notice d'utilisation pour se protéger contre les risques d'électrocution.
	Danger champ magnétique. Ce signal a été apposé sur l'appareil pour avertir l'opérateur de la présence d'un champ magnétique.
	Danger surface chaude. Ce signal a été apposé sur l'appareil pour empêcher l'opérateur de toucher des surfaces potentiellement chaudes risquant de causer des brûlures.

Stockage

Pour transporter et garder la pompe ionique il faut respecter les suivants conditions ambientes:

- Temperature: entre -20 °C et +70 °C;
- Humidité relative: entre 5 et 95% (sans condensation).

Préparation pour l'installation

La pompe est fournie dans un emballage de protection spécial; si l'on constate des signes d'endommagement imputables au transport, contacter aussitôt le revendeur local. Pendant l'opération de déballage, veiller tout particulièrement à ne pas laisser tomber la pompe et à ne lui faire subir aucun choc ni aucune vibration. Ne pas abandonner l'emballage dans la nature. Le matériel est entièrement recyclable et il est conforme à la directive CEE 85/399 en matière de protection de l'environnement.

ATTENTION! En vue d'éviter tout problème de dégazage, ne pas toucher à mains nues les éléments devant être exposés au vide. Portez toujours des gants spéciaux pour le vide ou toute autre protection appropriée.

NOTE La pompe ne peut être endommagée si elle reste simplement exposée à l'atmosphère. Il est quoi qu'il en soit conseillé de ne pas la retirer de son emballage avant le moment de l'installation, afin d'éviter toute pollution due à la poussière.

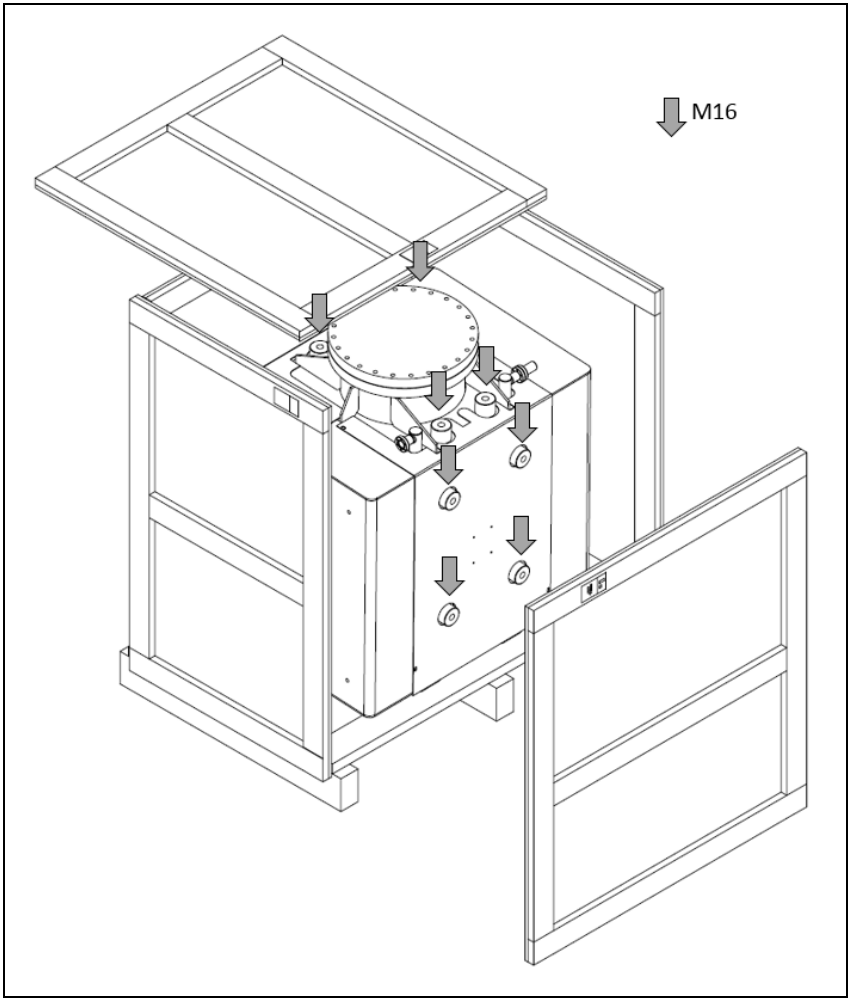


Figure 1 Emballage de la pompe Vaclon Plus 1000.

Installation

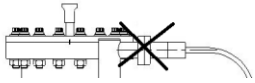
AVERTISSEMENT!

À cause de son poids, il est indispensable de se servir des équipements de levage et de manutention pour déplacer la pompe. Au cours de la manipulation, nous recommandons toujours l'utilisation simultanée de quatre anneaux (filetage M16).

Ne pas installer et/ou utiliser la pompe dans des milieux exposés à des agents atmosphériques (pluie, gel, neige), à des poussières, à des gaz de combat ainsi que dans des milieux explosifs ou à fort risque d'incendie. Pendant le fonctionnement, pour respecter les spécifications techniques déclarées la température ambiante doit être comprise entre 0 °C et +85 °C et l'humidité entre 0 et 95% (sans condensation).

ATTENTION! La pompe doit être conservée scellée avec son tuyau d'entrée aplati ("pinch-off") jusqu'à ce qu'elle soit prête à être branchée au système.

AVERTISSEMENT!



Pour éviter toute lésion aux personnes, ne pas brancher la haute tension à la pompe avant que celle-ci soit installée dans le système et avant que toutes les brides d'entrées soient correctement assemblées ou fermées.

Le fonctionnement de la pompe n'est optimisé que si celle-ci est utilisée avec l'une des unités de contrôle Agilent spécifiques.

ATTENTION! Lors de l'utilisation des pompes, le respect des normes de sécurité est impérativement subordonné à l'emploi des unités de contrôle Agilent.

AVERTISSEMENT!

Pour les installations à la verticale dans lesquelles la pompe ne se repose pas à la base ou pour une installation dans une position différente de la verticale, la pompe, à cause de son poids, doit être prise en charge de manière appropriée par les supports. Nous recommandons l'utilisation simultanée de quatre points de fixation (filetage M16).

La pompe VacIon Plus 1000 peut être installée dans toutes les positions, si elle est correctement prise en charge. Par facilité elle est généralement montée en position verticale avec la bride d'entrée au sommet, en utilisant comme support les pieds sous la pompe. Pour les installations à la verticale dans lesquelles la pompe ne se repose pas à la base ou pour une installation dans une position différente de la verticale, la pompe, en raison de son poids, doit être prise en charge convenablement par les supports (des barres ou des plaques de support, dont la géométrie dépend du type de système sur lequel est montée la pompe). Lesdits supports peuvent être couplés à la pompe à travers les cliquets (par filetage M16) présents des deux côtés de la pompe. Il est recommandé de toujours utiliser quatre points de levage simultanément.

Pour plus de détails sur l'installation de la pompe, consulter l'appendice "Technical Information".

Utilisation

Toutes les instructions pour le fonctionnement correct de la pompe VacIon Plus sont fournies dans la notice de l'unité de contrôle. Il est conseillé de lire attentivement cette notice avant d'utiliser la pompe.

La pompe doit être amenée à une pression inférieure ou égale à 1E-5 Torr (mbar) pour la version Diode - 1E-4 Torr (mbar) pour la version StarCell – pour permettre un démarrage plus rapide et prolonger la durée de vie de la pompe. Ce niveau de pression peut être obtenu facilement au moyen d'une pompe turbomoléculaire assistée par une pompe primaire, si possible non lubrifiée par huile, afin d'éviter les risques de contamination liés aux vapeurs d'huile.

En principe, la pompe ionique peut être démarrée à une pression supérieure à celle préconisée par le fabricant, mais cette pratique risque, à la longue, de réduire la durée de vie de la pompe. Auparavant, la nécessité de démarrer la pompe ionique avec une haute pression était liée au besoin de la raccorder directement à la pompe primaire. Avec l'arrivée des pompes turbomoléculaires, cette nécessité a disparu.

Des dépôts hygroscopiques découlant naturellement de l'exposition de la pompe à l'air et l'absorption d'hydrogène à l'intérieur des cathodes en titane, phénomène lié au principe physique de fonctionnement de la pompe, peuvent, avec le temps, provoquer un allongement du temps de démarrage. En effet, le réchauffement de la pompe qui se produit au moment du démarrage entraîne une émission de vapeur d'eau et d'une partie de l'hydrogène pompé précédemment qui allonge le temps de démarrage.

Procédure d'utilisation

1. Contrôler que la polarité de l'unité de contrôle soit correcte pour la pompe: polarité positive pour les pompes Diode et polarité négative pour les StarCell. Pour cette raison, consultez le manuel du contrôleur. Respectez la procédure suivante pour l'utilisation de la pompe: amenez le système de vide à une pression minimum de démarrage en vous référant au tableau 1 à l'aide d'une pompe turbomoléculaire de pré-vide (assistée par une pompe primaire). Il est conseillé d'installer une vanne de fermeture métallique entre la pompe ionique et la pompe turbomoléculaire afin de pouvoir ensuite exclure cette dernière.
2. Raccordez l'unité de contrôle de la pompe à une alimentation électrique et mettez-la sous tension. En suivant les instructions du manuel de l'unité de contrôle, alimentez la pompe ionique.
3. Surveillez la tension, le courant et la pression affichés sur l'écran de l'unité de contrôle. Si le démarrage a eu lieu à une pression trop élevée, la tension se stabilisera à une valeur de quelques dizaines de volts. Si la tension reste stable autour de cette valeur, arrêtez la pompe pour éviter la surchauffe, attendez quelques instants et redémarrez-la à une pression inférieure (voir le paragraphe "Utilisation". Notez qu'une valeur de courant proche du courant de court-circuit de l'unité de contrôle indique la présence d'une fuite dans la pompe et dans le système. De plus une augmentation temporaire de la pression de pré-vide est normale pendant la phase de démarrage.
   Si la pompe ionique a été démarrée à la pression suggérée (voir tableau 1), la tension atteint rapidement la valeur programmée sur l'unité de contrôle (3,5 ou 7 kV). Une fois la tension de fonctionnement atteinte, le courant commence à descendre. Fermez alors la vanne de pré-vide pour isoler la pompe ionique et le système de la pompe turbomoléculaire. Si la tension de la pompe ionique descend après la fermeture de la vanne, rouvrez-la pour un pré-pompage supplémentaire. Dès que la pression descend, la tension remonte et la vanne de pré-vide peut être fermée.
4. Quand la tension a atteint la valeur de fonctionnement programmée, placez l'unité de contrôle à l'état PROTECT, si l'unité de contrôle a cette prédisposition. Le système est ainsi auto-protégé contre les hausses de pression supérieures à la valeur programmée. En cas d'élévation excessive de la pression, l'unité de contrôle s'arrête automatiquement.

5 Si l'unité de contrôle vous permet de définir le type de pompe en cours d'utilisation, l'écran affiche la valeur de pression résultant de la conversion du courant, selon le diagramme pression-courant décrit dans «Informations techniques» dans ce manuel. Si l'unité de contrôle n'a pas cette prédisposition vous pouvez faire référence directement à ce diagramme. Il est rappelé que l'indication de la pression peut être erronée si la pompe ionique développe un courant de dispersion pendant son utilisation. Dans ce cas, la pression obtenue par la conversion du courant sera supérieure à la pression réelle.

6 Lorsque l'on porte la pompe à la pression atmosphérique, utiliser de l'azote sec de façon à éviter que les parois de la pompe n'absorbent de la vapeur d'eau. Après l'arrêt de la pompe, il est conseillé d'attendre le refroidissement des composants internes avant de l'exposer à la pression atmosphérique.

AVERTISSEMENT!

Lorsque la pompe est utilisée pour le pompage de gaz toxiques, inflammables ou radioactifs, suivre les procédures appropriées à chaque gaz. Ne pas utiliser la pompe en présence de gaz explosifs.

AVERTISSEMENT!

Lorsque le réchauffeur est installé, éviter de toucher la pompe pendant les opérations de chauffage et de refroidissement. La température élevée peut provoquer des brûlures.

ATTENTION!

Ne pas approcher de dispositifs électroniques de la pompe. Le champ magnétique environnant cette dernière peut entraîner des dysfonctionnements desdits dispositifs.

Maintenance

Les pompes de la série VacIon Plus ne demandent aucun entretien. Toute intervention doit être exécutée par un personnel agréé.

AVERTISSEMENT! **Avant toute intervention sur la pompe, la débrancher de la haute tension.**

En cas de mise au rebut d'une pompe, procéder à son élimination dans le respect des normes nationales en vigueur.

Mise au rebut

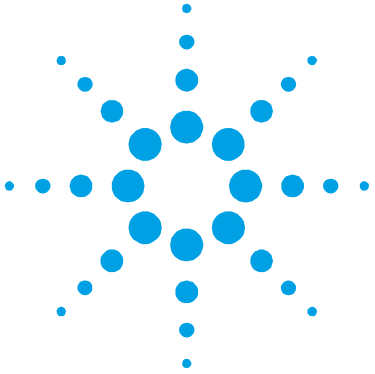
Signification du logo "WEEE" imprimé sur les étiquettes.
Le symbole ci-dessous est appliqué conformément à la directive CE nommée "WEEE".

Ce symbole (**uniquement valide pour les pays de la Communauté européenne**) indique que le produit sur lequel il est appliqué NE doit PAS être mis au rebut avec les ordures ménagères ou les déchets industriels ordinaires, mais passer par un système de collecte sélective.

Après avoir vérifié les termes et conditions du contrat de vente, l'utilisateur final est donc prié de contacter le fournisseur du dispositif, maison mère ou revendeur, pour mettre en œuvre le processus de collecte et mise au rebut.

Pour plus d'informations, rendez-vous à l'adresse:

http://www.agilent.com/environment/product/index.shtml



4
Installation Procedure

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Original Instructions

General Information

This equipment is destined for use by professionals. The user should read this instruction manual and any other additional information supplied by Agilent before operating the equipment. Agilent will not be held responsible for any events occurring due to non-compliance, even partial, with these instructions, improper use by untrained persons, non-authorized interference with the equipment or any action contrary to that provided for by specific national standards.

The VacIon Plus series pumps are ion pumps commonly used to create ultra-high vacuum, due to their cleanliness, ability to pump different gases, and maintenance- and vibration-free operation.

The following paragraphs contain all the information necessary to guarantee the safety of the operator when using the equipment. Detailed information is supplied in the appendix "Technical Information".

This manual uses the following standard protocol:

WARNING! **The warning messages are for attracting the attention of the operator to a particular procedure or practice which, if not followed correctly, could lead to serious injury.**

CAUTION! The caution messages are displayed before procedures which, if not followed, could cause damage to the equipment.

NOTE The notes contain important information taken from the text.

Safety Symbols

SYMBOLS	SYMBOLS DESCRIPTIONS
	Access denied to active pacemaker's holders. The device is marked with this symbol t to indicate that pacemaker holders must not come in contact with the device itself.
	Electric hazard. The device is marked with this symbol when the operator, due to the presence of an high voltage, must refer to the user manual in order to protect himself from electrical shock risks.
	Magnetic field hazard. The device is marked with this symbol to inform the operator about the presence of a magnetic field.
	Hot surface hazard. The device is marked with this symbol when the operator must avoid the contact with potentially hot surfaces which may cause burns.

Storage

During transportation and storage of the ion pump, the following environmental conditions must be respected:

- Temperature: between -20 °C and +70 °C;
- Relative humidity: between 5 and 95% (without condensation).

Preparation for Installation

The pump is supplied in a special protective packing. If this shows signs of damage which may have occurred during transport, contact your local sales office. When unpacking the pump, be sure not to drop it and avoid any kind of sudden impact or shock vibration to it. Do not dispose of the packing materials in an unauthorized manner. The material is 100 % recyclable and complies with EEC Directive 85/399.

CAUTION! In order to prevent outgassing problems due to contamination, do not use bare hands to handle components which will be exposed to vacuum. Always use vacuum-compatible gloves or other appropriate protection.

NOTE Normal exposure to the environment cannot damage the pump. Nevertheless, it is advisable to keep it closed until it is installed in the system, thus preventing any form of pollution by dust.

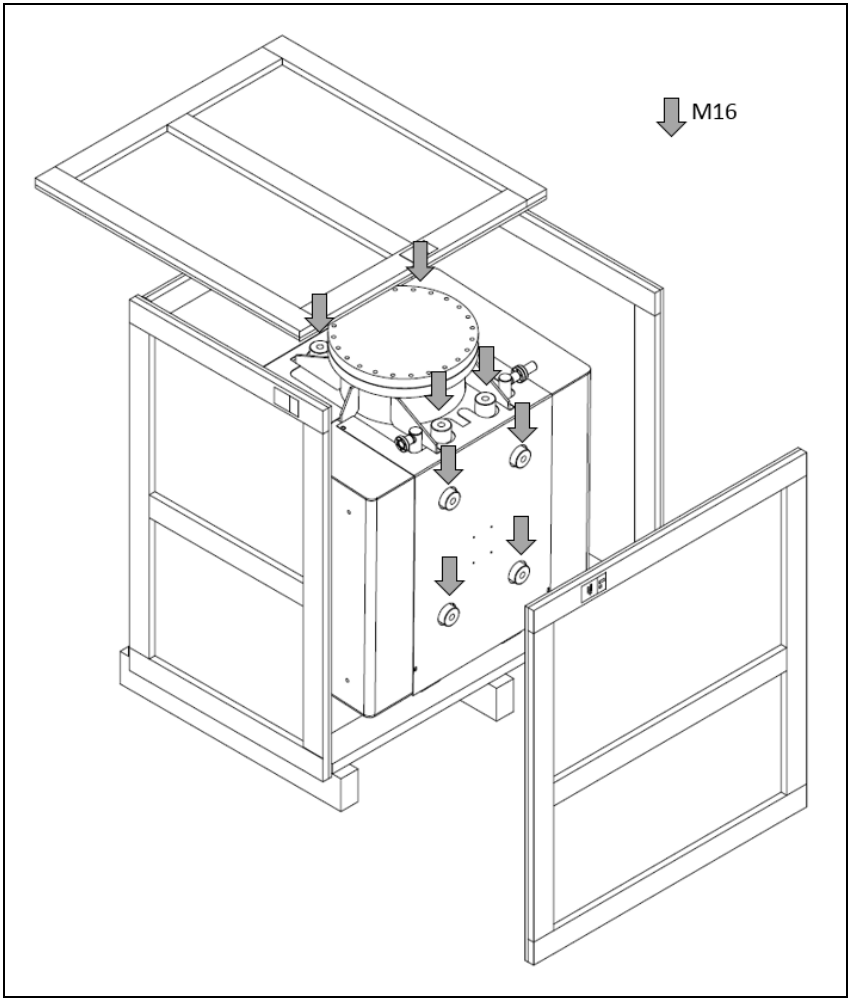


Figure 1 Packaging of the VacIon Plus 1000 pump.

Installation

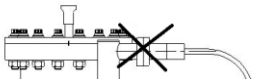
WARNING!

The pump is heavy and must be handled by means of suitable moving and handling tools. During handling it is always recommended the simultaneous use of four eyebolts (M16 thread).

Do not install or use the pump in an environment exposed to atmospheric agents (rain, snow, ice), dust, aggressive gases, or in explosive environments or those with a high fire risk. During operation, to obtain the declared functioning specification, the ambient temperature must be between 0 °C and +85 °C and the humidity between 0 and 95% (without condensation).

CAUTION! The pump should be kept sealed with its pinch-off tube until it is ready for attachment to the vacuum system.

WARNING!



To avoid injury, never connect the high voltage to the pump before it is installed into the system and all the inlet flanges are properly connected or blanked off.

The pump operation is optimized using one of the special Agilent controllers only.

CAUTION! The safety specifications agreement using the pump is guaranteed using the Agilent controller only.

WARNING!

For installations in vertical in which the pump is not resting at the base or for installation in a position other than vertical, the pump, due to its weight, must be conveniently supported. It is recommended the always use four attachment points.

The VacIon Plus 1000 pump can be installed in any position, if conveniently supported. For convenience it is normally mounted in a vertical position with the inlet flange at the top, using as a support the brackets under the pump. For installations in vertical in which the pump is not resting at the base or for installation in a position other than vertical, the pump, due to its weight, cannot be mounted cantilevered, but must be suitably supported by the supports (bars or plates of support, whose geometry depends on the type of system on which the pump is mounted). Such supports can be coupled to the pump via the studs (with M16 thread) present on both sides of the pump. It is recommended to always use four lifting points simultaneously.

For detailed information about the pump installation, see the appendix “Technical Information”.

Use

All the instructions for the correct use of the VacIon Plus pumps are contained in the control unit manual. Read that manual carefully before using the pump.

Rough pumping down to a pressure equal or lower than 1E-5 Torr (mbar) for the Diode version - 1E-4 Torr for the StarCell version - is recommended for the most rapid starting and in order to preserve pump lifetime. Typically this pressure level can be easily achieved by means of a turbomolecular pump, supported by a primary pump, preferably oil free.

The ion pump can in principle be started also at pressure higher than the one we recommend, but this prolonged practice can affect the pump lifetime. In the past the need to start the ion pump at high pressure was due to the fact that it was directly connected to the primary pump; thanks to the invention of turbomolecular pumps, this is no longer necessary.

Hygroscopic deposits - that are natural consequence of exposure to air- and hydrogen absorption into the titanium cathodes – phenomenon connected to the physical working principle of the ion pump - may cause starting times to increase with age. In fact the pump heating that takes place at its start-up causes release of the water vapor and some previously pumped hydrogen; thus, the starting time may be lengthened.

Operating Procedure

1. Check that the controller HV polarity is correct for the pump: positive polarity for Diode pumps and negative for StarCell pumps. Refer to the relevant pump control unit instruction manual and follow the procedure below when operating the pump: establish a minimum starting pressure in the vacuum system per the table 1, by means of a pre-vacuum turbomolecular pump (supported by a primary pump). We recommend to install an all-metal valve between the ion pump and the turbomolecular pump, in order to be able to insulate it at a later stage.
2. Plug the control unit into a suitable power source and switch the power ON. Follow the instructions in the manual of the control unit to feed the ion pump.
3. Observe the voltage, current and pressure on the display of the control unit. If the ion pump has been started at too high pressure, typically the voltage will be of some hundreds Volts. If the voltage remains constant at these values, in order to avoid pump overheating we suggest to turn it off and start it again at a lower pressure (see the paragraph “Use”). A current value near the short-circuit current of the control unit could indicate that an unconfined flow discharge exists in the pump and system. A temporary rise in roughing pressure will usually be noticed during any starting procedure. If the ion pump has been started to the recommended pressure (the table 1), the voltage will quickly reach the pre-set value (3, 5 or 7 kV). Once at the operating voltage, the current will start to decrease. We recommend at this point to close the roughing valve, in order to insulate the ion pump and the system from the turbomolecular pump.
If the ion pump voltage drops after closing the roughing valve, reopen the valve for additional rough pumping. As the pressure decreases, the voltage again will rise, and the roughing valve may be closed.
4. When the voltage has reached the pre-set operating value, set the control unit in the PROTECT condition, if the control unit has this predisposition. The system is now automatically protected against pressure increases above the pre-set limit. If such an increase should occur, the control unit will be turned off automatically.
5. If the control unit allows you to set the pump type in use, the controller display will show the pressure value obtained by the conversion of the current value, as per the pressure versus current graph shown in the paragraph “Technical Information” of this manual. If the controller does not have this predisposition, please directly refer to this diagram. It is worth noticing that the pressure indication could be not correct if, during its operation, the ion pump starts to be affected by leakage current. In this case the pressure obtained by the current conversion shown on the display will be higher than the real one.

6 When venting the pump, use dry nitrogen. This will avoid water vapor absorption on the pump walls. After the pump has been turned off, we recommend to wait that its internal elements are cooled down before exposing the pump to atmospheric pressure.

WARNING!

When employing the pump for pumping toxic, flammable, or radioactive gases, please follow the required procedures for each gas disposal. Do not use the pump in the presence of explosive gases.

WARNING!

When the heating element is installed, do not touch the pump during the heating and cooling phases. The high temperature may cause a serious damage.

CAUTION! Do not put any electronic device near the pump since the magnetic field may cause a device malfunction.

Maintenance

The VacIon Plus series pump does not require any maintenance. Any work performed on the pump must be carried out by authorized personnel.

WARNING! **Before carrying out any work on the pump, disconnect it from the High Voltage supply.**

If a pump is to be scrapped, it must be disposed of in accordance with the specific national standards.

Disposal

Meaning of the "WEEE" logo found in labels.

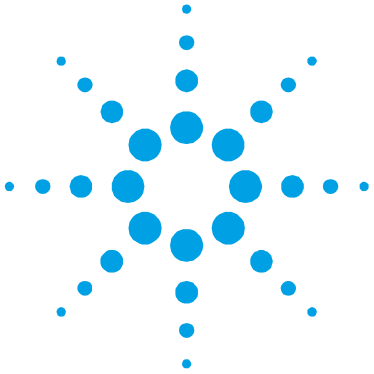
The following symbol is applied in accordance with the EC WEEE (Waste Electrical and Electronic Equipment)

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.

For more information refer to:

http://www.agilent.com/environment/product/index.shtml



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Description of the VacIon Pump

The Agilent VacIon Plus 1000 pumps are ion pumps and are available in two element versions:

- Diode (X3604-64000): equipped with one Fischer feedthrough; heaters (not mounted) can be provided separately as accessory.
- StarCell (X3604-64020): equipped with two Fischer feedthroughs, and heaters already mounted.

Diode pumps equipped with two feedthroughs or StarCell pumps equipped with one feedthrough can be provided; also different heater configurations are available. Please contact the local Agilent representative for reference.

The inlet ConFlat flange is a CFF 12” (DN250).

VacIon Plus 1000 pumps are designed to operate in the pressure range from the recommended maximum starting pressure (1E-5 mbar for Diode or 1E-4 mbar for StarCell) to the ultimate pressure (below 1E-11 mbar). The maximum suggested starting pressure for the StarCell version is one order of magnitude higher with respect to Diode, because thanks to its design the ions are prevented from bombarding the system and the pump walls while starting. This reduces the pressure rise that can be associated with the starting phase and the consequent temperature increase. As pointed out in the paragraph “Use”, the ion pump can in principle also be started at higher pressure, but this prolonged practice can affect the pump lifetime. Moreover, it is worth noticing that there is not in theory a limit to the achievable ultimate pressure, but the measurement of pressures below 1E-11 mbar (in the eXtreme High Vacuum - XHV - range) by means of a gauge is very difficult, due to the intrinsic limitations of the gauge itself. Moreover, the achievement of the ultimate pressure strongly depends on how efficiently the bakeout of the complete system is performed.

Virtually all gases and vapors can be pumped successfully with the ion pump. The pumping speed will vary depending on the system pressure, the gas type, the pump element (Diode/StarCell) and the applied operating voltage. The latter can be optimized using Agilent controllers, in order to always feed the pump at the voltage for which the pumping speed is maximized.

For the pumping of noble (or inert) gases, we recommend the use of StarCell elements.

The StarCell is the best-in-class solution for pumping noble gases. It is the latest variation of a triode configuration. Thanks to its engineered design, StarCell pumps can handle a very high amount of noble gases (better than Noble Diode type pumps – one order of magnitude more) and hydrogen (comparable to the Diode).

Fig. 2 shows the VacIon Plus 1000 pump, Fig. 3 shows the main assemblies of the pump.

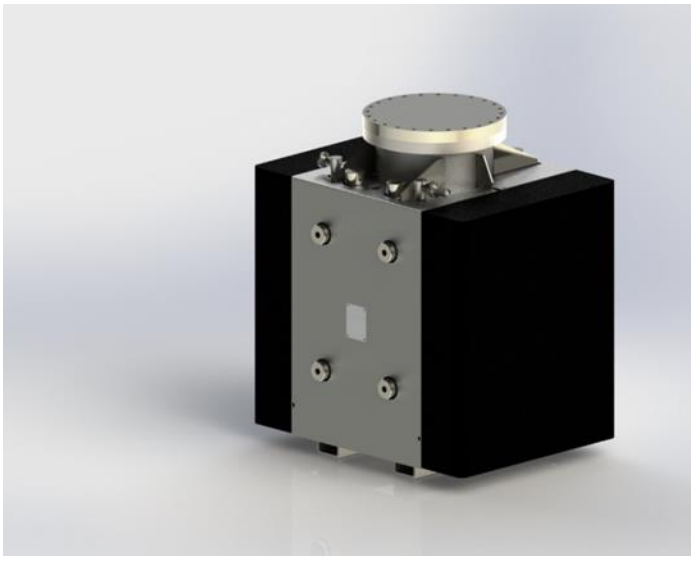

Figure 2 VacIon Plus 1000 pump.

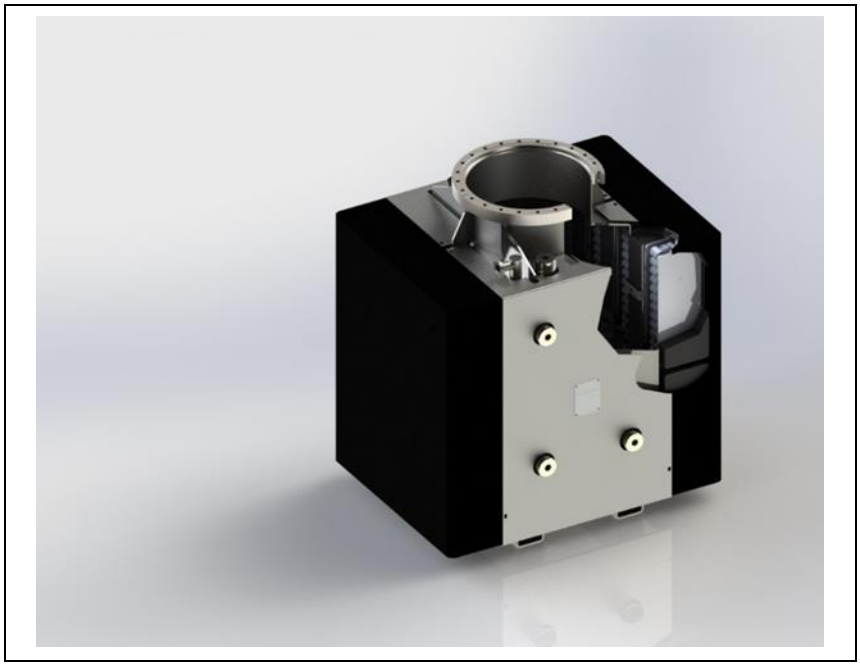

Figure 3 Cut-away showing the main pump assemblies.

Technical Specification

The following table details the main technical specifications of the VacIon Plus 1000 pumps.

Tab. 1

Specification		Model	
		Diode	StarCell
Saturated pumping speed for Nitrogen (*) (l/s)		1100	900
Saturated pumping speed for Argon (*) (l/s)		--	590
Operating life at 1E-6 mbar of Nitrogen (hours)		50000	80000
Suggested maximum baking pressure with ion pump on (mbar)		5E-6	
Protect current		200 mA	
Operating voltage (max)		+7000 Vdc +/- 10 %	-7000 Vdc +/- 10 %
Suggested starting pressure (mbar)		≤ 1E-5	≤ 1E-4
Ultimate pressure (mbar)		1E-11	
Inlet flange		12" CFF (NW250) AISI 304 ESR or 316LN ESR	
Internal volume (litres)		136	
Temperature limits (°C):			
	Pump without magnets	450	
	Pump with magnets	350	
	HV cable	220	
Material:	Body	AISI 304L	
	Cathodes	Titanium	Titanium
	Anodes	AISI 304L	
	Magnets	Ferrite (Ceramic 8)	
	Pole piece	Iron	
Weight without heaters, lbs (kg)		585 (265)	

(*) Tested according DIN28429; see also ISO/DIS 3556-1-1992 (draft ISO norm) for reference.

Figures 4 to 8 show the typical pumping speed vs. pressure diagrams for saturated and unsaturated pumps and the pressure vs. current diagrams. Please notice that the current-pressure curves in Figs 5 and 8 refer to the pump equipped with one feedthrough. In case the pump is equipped with two feedthroughs, you must refer to the current-pressure curves of the corresponding VacIon 500 pump model. Unsaturated curves are given as reference, since the measurement of the pumping speed in the unsaturated state is not described in the norms and may be strongly influenced by the testing conditions. The pumping speed of a new or newly regenerated (i.e. baked) sputter ion pump is typically higher (for nitrogen about 180-190%, depending on the pressure range) than its nominal pumping speed; it decreases during operation until it reaches a stabilized level known as "saturation" (corresponding to the nominal pumping speed). Saturation does not correspond to the end of the pump life. For further explanation on the physics of this phenomenon, please refer to the section “VacIon Plus Pumping Speed” of the ion pump general catalogue. It is worth noticing that to saturate the VacIon Plus 1000 pumps, it normally requires an amount of gas of about 30 mbar-liters (in the case of nitrogen). Consequently, pumps can operate for extended periods of time at low pressures in the non-saturated state, if they are properly conditioned. Moreover, we point out that for the unsaturated curves only the first part of the curve is shown, since during the measurement (carried out from low pressure towards high pressure) the pump starts to move from the unsaturated to the saturated condition, so that in the transient phase it cannot be clearly be classified as unsaturated or saturated. It is also worth noticing that the shown current versus pressure curves are typical and may appear different in the presence of a leakage current. A small deviation from the reported curve may also be due to the intrinsic uncertainty of the gauge reading.

Vaclon Plus 1000 Diode

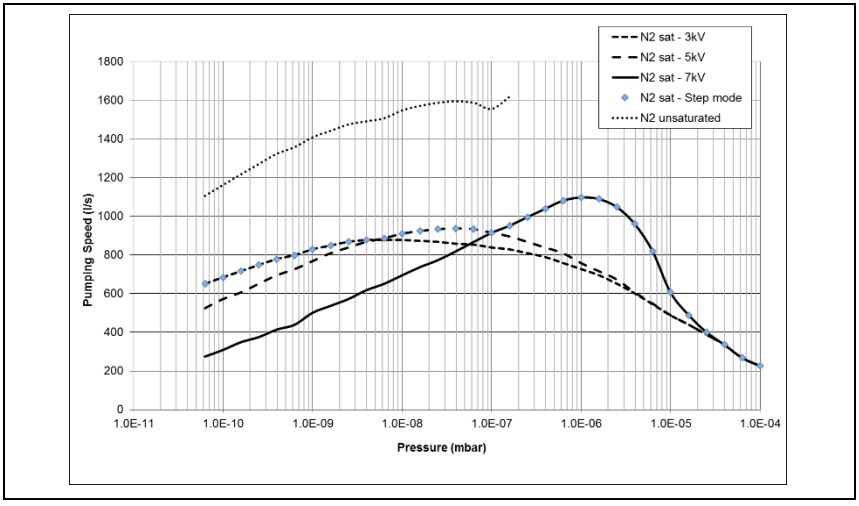

Figure 4 Typical pumping speed vs pressure diagram for Nitrogen (Diode).

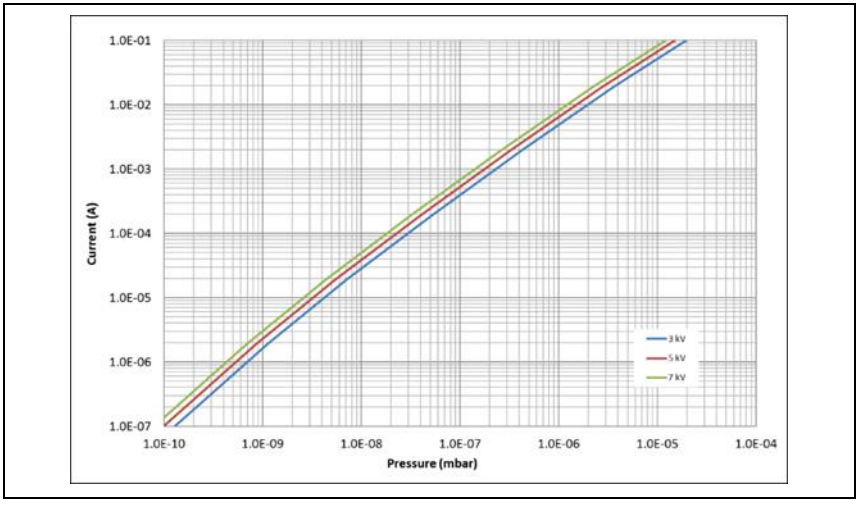

Figure 5 Typical pressure vs current diagram (Diode with one feedthrough).

Vaclon Plus 1000 StarCell

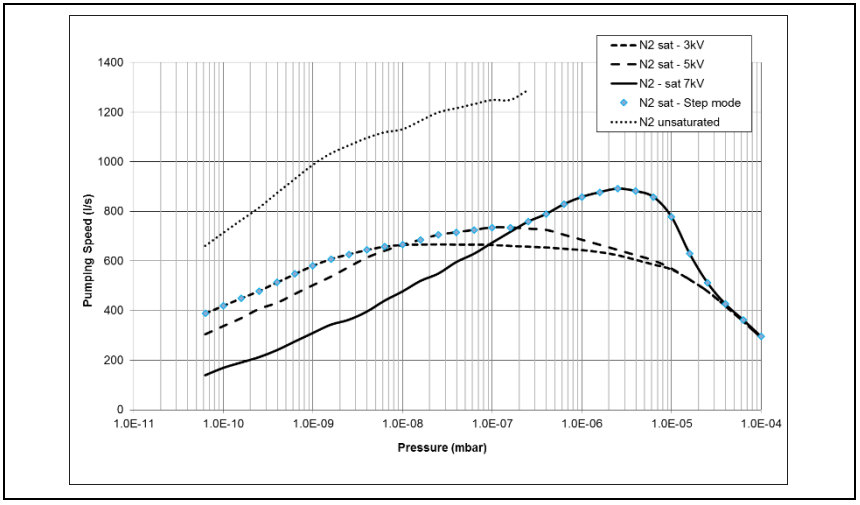

Figure 6 Typical pumping speed vs pressure diagram for Nitrogen (StarCell).

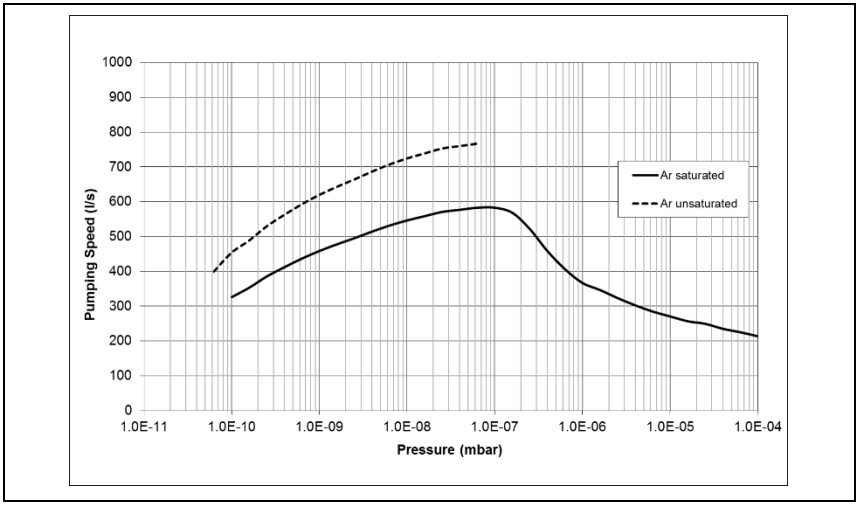

Figure 7 Typical pumping speed vs pressure diagram for Argon (StarCell).

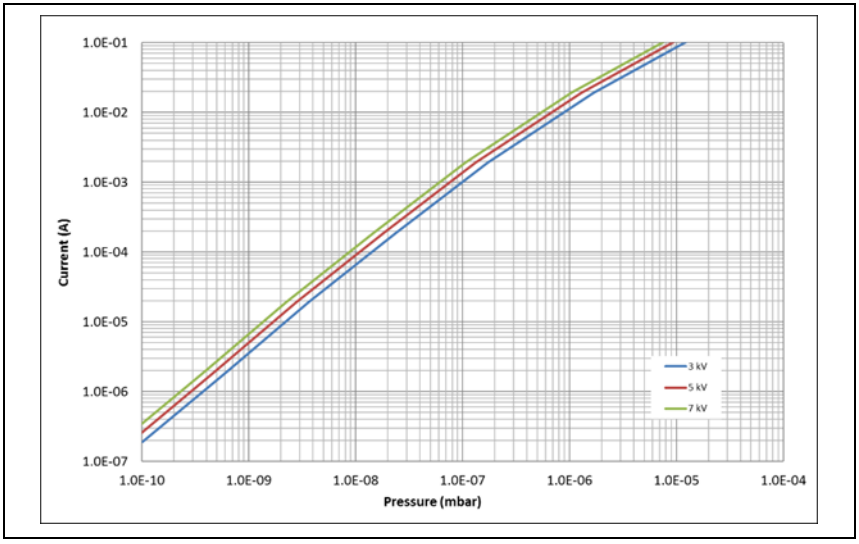

Figure 8 Typical pressure vs current diagram (StarCell with one feedthrough).

Outline Drawing

The following figures show the outline drawing for the VacIon Plus 1000 pump.

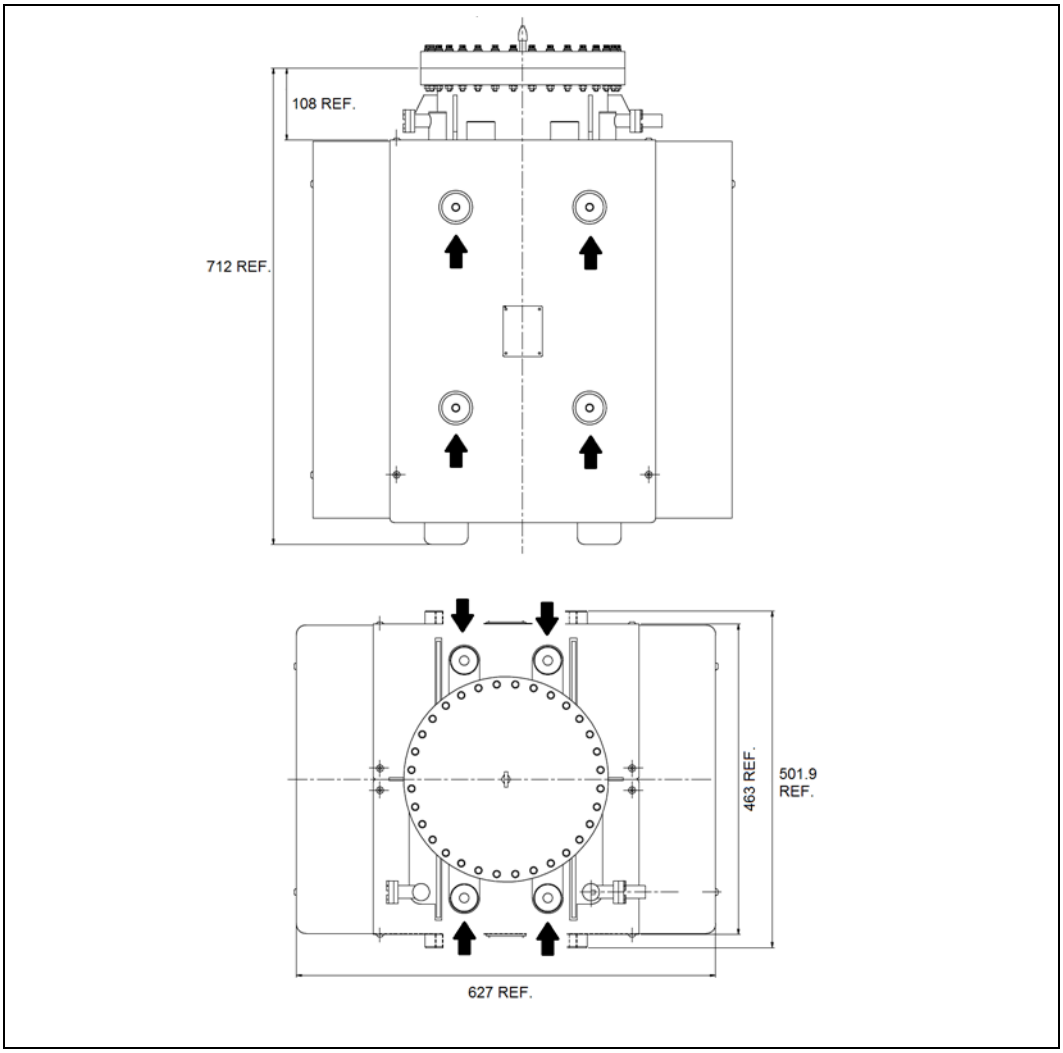

Figure 9 VacIon Plus 1000 outline drawing, showing pump overall dimensions (in mm). Arrows indicate M16 threaded studs.

Stray Magnetic Field

The stray magnetic field of the pump was measured by means of a probe along several paths. Fig. 10 shows the pump axis identification to which we refer in this paragraph. It is worth noticing that the background contribution due to the Earth magnetic field was subtracted from the measured values.

Curves of stray magnetic field strength along the centre line of the pump and in the plane of the flange as a function of distance from the pump are shown in Figs. 11, 12, 13, 14 and 15, where Bx is the magnetic field along X axis, By is along Y axis and Bz is along Z axis.

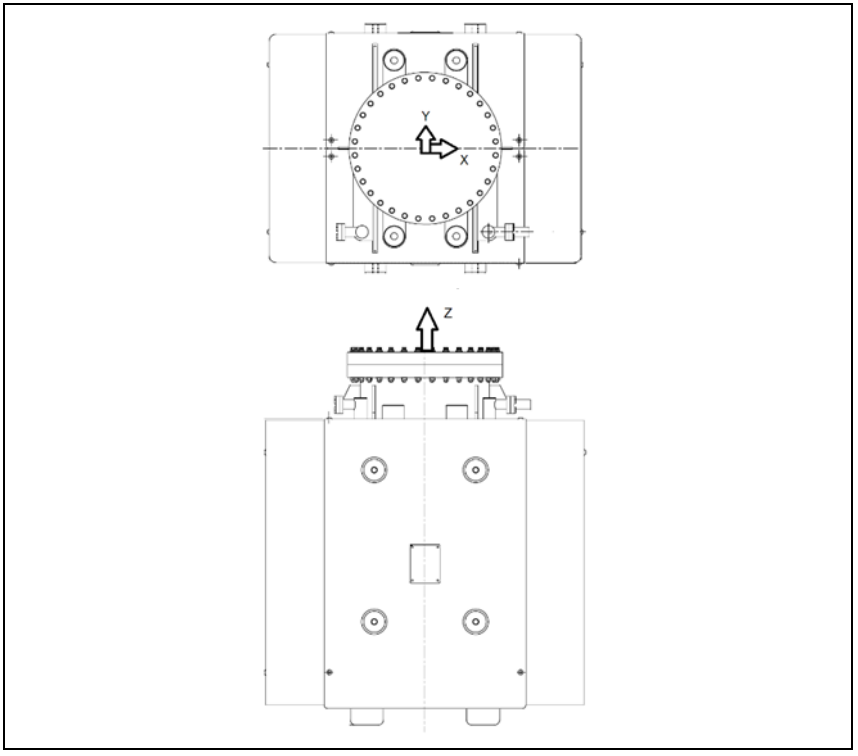

Figure 10 Pump axis identification.

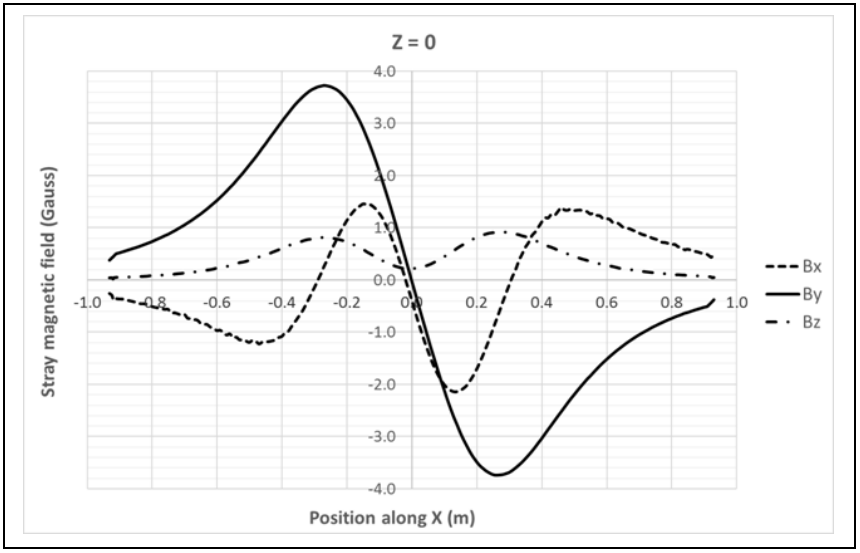

Figure 11 Typical stray magnetic field from the center of the flange along X axis (z = 0 mm).

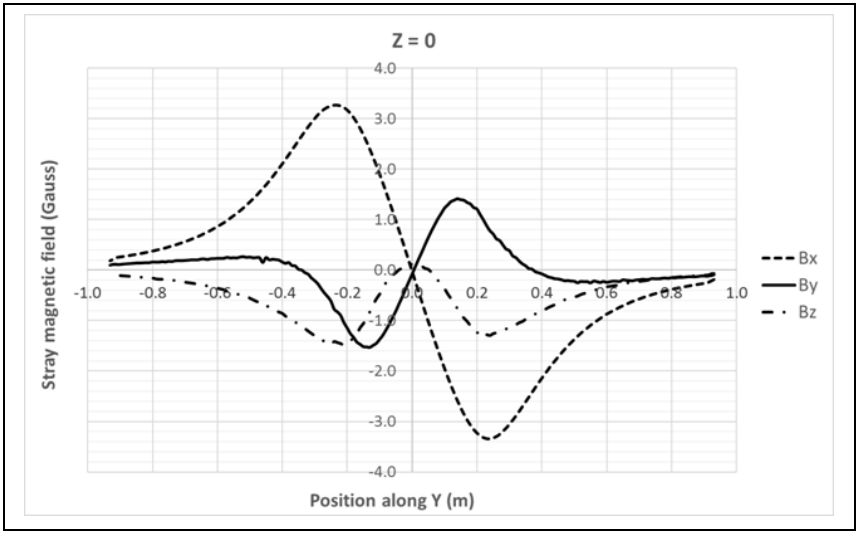

Figure 12 Typical stray magnetic field from the center of the flange along Y axis (z = 0 mm).

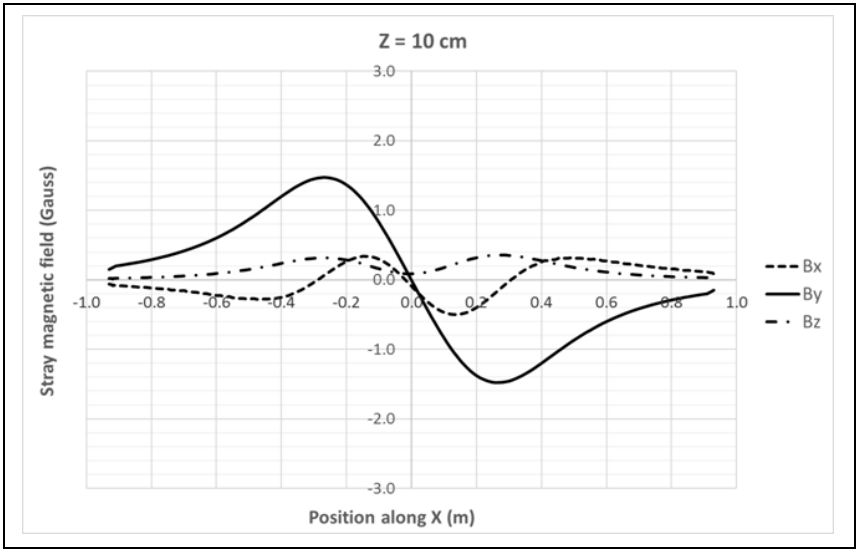

Figure 13 Typical stray magnetic field from the center of the flange along X axis (z = 100 mm).

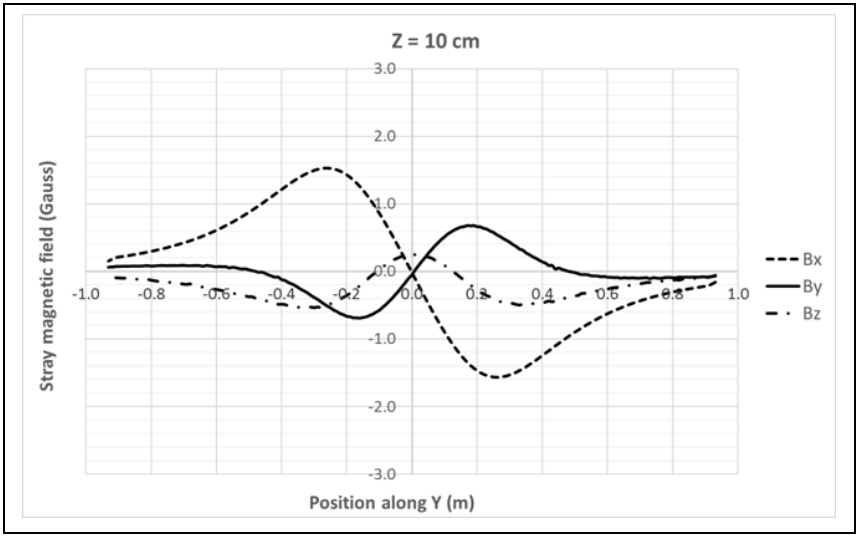

Figure 14 Typical stray magnetic field from flange along Y axis (z = 100 mm).

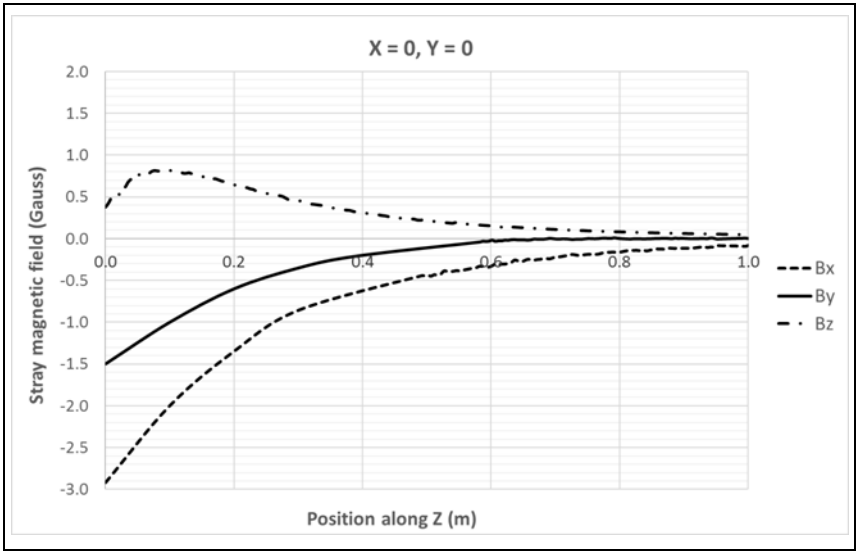

Figure 15 Typical stray magnetic field from flange along Z axis.

VacIon Plus Pump Installation

Inspection Procedure

VacIon Plus pumps are evacuated, baked out, sealed and leak-checked at below 1E-10 mbar prior to shipping. The following information and procedures can be used to evaluate the vacuum integrity of a VacIon Plus pump before installation.

Visual Inspection

Inspect the pump and magnet for physical damage which may have occurred during shipment. Inspect the pinch-off seal (that is covered by a rubber cap). If it is open, the pump is at atmospheric pressure.

WARNING! **The pinch-off seal is extremely sharp. Be careful when opening. Watch your fingers.**

A VacIon Plus pump that has been exposed to atmosphere during shipment, or while in storage, will operate properly if it has not been damaged.

The pump is not harmed by such exposure, although it is good practice to keep it under vacuum when not in use, in order to avoid the dust contamination and the accumulation of water vapor from the environment.

Vacuum Evaluation

The ion pump is shipped in an evacuated condition. Before removing the shipping flange for installation on a vacuum system, it is recommended to briefly start the pump in order to verify vacuum integrity and proper operation.

To verify the vacuum integrity of the new pump before venting:

1 Connect the ion pump to the control unit as described in the instruction manual of the control unit.

WARNING!

The high voltage which is applied to the ion pump by the control unit can cause severe injury or death. Be sure that the high voltage cable is properly connected to the ion pump and its power unit. Make sure that the pump is well grounded.

---

2 With the main power switch in the OFF position, plug the control unit into a suitable power source.

3 Turn the power to ON.

4 Turn the ion pump on by following the instructions on the control unit manual. Observe the reading on the unit display for an indication of one of the following conditions:

   a If the pump is free of leaks and is at a low pressure, the pressure indication shall quickly fall to or below the 1E-8 mbar range as the volume of gas is pumped.

   b If the pressure inside the pump is at or near atmospheric level, an arc may strike inside the high voltage feedthrough giving a popping sound and the pump current will fluctuate. If this occurs, turn the power OFF immediately.

5 If the vacuum integrity has been lost, the pump should be leak-checked with a mass spectrometer leak detector before installation on the system.

Short Circuits

If there is a short circuit between the anode and the cathode or, in the case of the StarCell, between the cathode and the pump body, the short-circuit current of the control unit will be drawn and low voltage will be indicated. If a short circuit exists in the control unit or high voltage cable and connector, low voltage will also be observed when the high voltage connector is disconnected from the pump (refer to the control unit manual).

An ohm meter reading on the pump feedthrough may not be effective in finding a short.

Short circuits may be caused by mechanical shock to the pump. If the pump is shorted, contact Agilent.

Typical Installation

A typical installation is shown in the following figure and consists of:

1. VacIon Plus pump.
2. Ion pump control unit.
3. Clean roughing pump (typically a turbomolecular pump).
4. Thermocouple gauge, able to indicate the pressure from atmosphere to 1E-3 mbar range.
5. Metallic valve to seal off the roughing pump from the vacuum chamber. Roughing lines are usually made of stainless steel or copper tubing or other low vapor pressure material.
6. High voltage cable.
7. Primary backing pump (e.g. a scroll pump).
8. High vacuum gauge (e.g. Agilent UHV24 or UHV24P).
9. Vacuum chamber.

A metallic valve to seal off the ion pump from the rest of the system may also be installed if required.

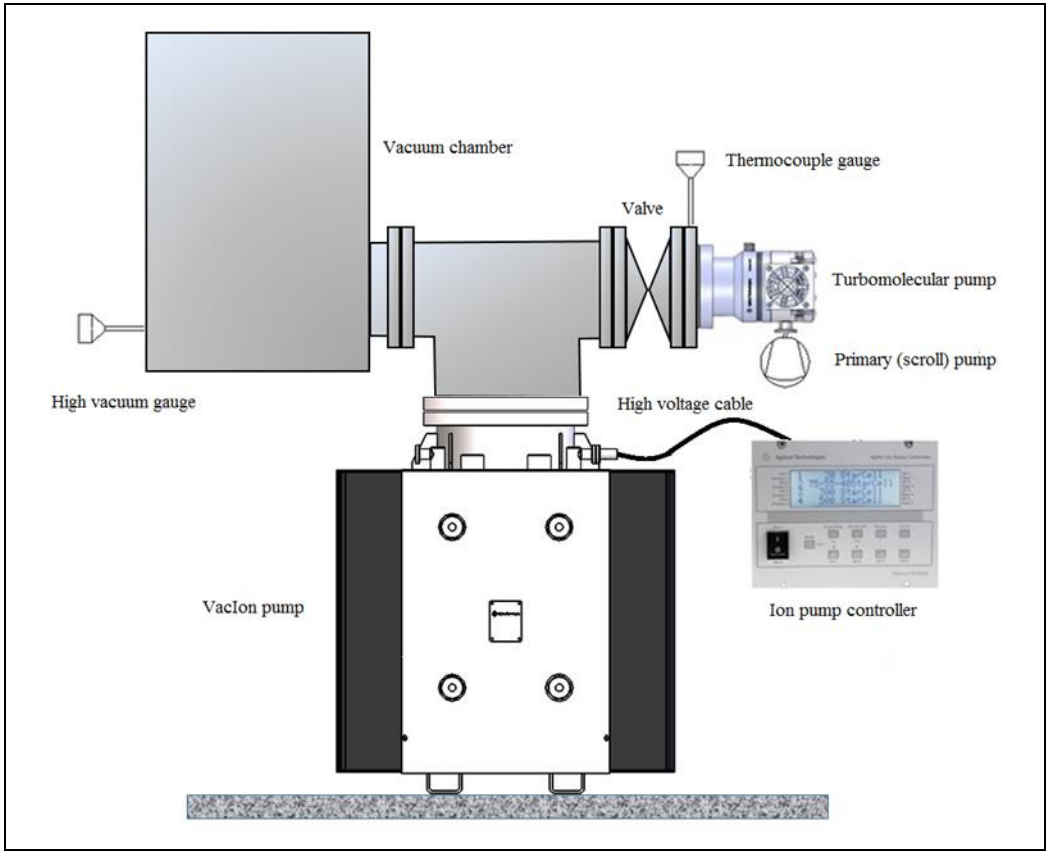

Figure 16 Typical installation.

Inlet Flange Connection

The pump should be mounted allowing a sufficient clearance for installation and removal of the high voltage connector.

The pump should be kept sealed with its pinch-off tubulation until it is ready for the connection to the vacuum system. This avoids the accumulation of dust and other undesirable materials. Before breaking the pinch-off seal, consult the inspection procedure (see the previous paragraph).

Vent the ion pump by opening the pinch-off tubulation in a clean area free from smog, dust, pollen, etc. Venting with dry nitrogen gas is strongly recommended. This can be done by placing a clean polyethylene bag over the ion pump flange. Small pumps can be completely placed inside of the bag. Put a pair of pliers inside the bag, too, and purge the bag with clean, dry nitrogen for several minutes; then handle the pliers from outside the bag in order to break the internal pump vacuum, by opening a small leak in the copper tube pinch-off.

CAUTION! Do not open the pinch off-seal with a saw or grinder. These methods will cause metal particles to be drawn into the pump by the in-rushing air as the pump is opened.

WARNING! **The pinch-off seal is extremely sharp. Be careful when opening. Watch your fingers.**

Use appropriate procedures to maintain the clean condition of the pump and vacuum system.

Unscrew the main flange bolts and lift the blank flange. Remove the copper gasket plate, that must not be reused. Some particles of copper oxide may adhere to the outer edge of the flange gasket. Be careful not to allow them or any other foreign materials to fall into the pump.

CAUTION! While removing the copper gasket, pay attention in order to not scratch the knife edge of the flange. Do not use a screwdriver or a similar tool in the attempt of lifting the gasket, since you risk to hit the knife edge during this operation.

CAUTION! If the pump is equipped with an inlet screen, let it installed inside the pump neck. The inlet screen is not fixed to the neck, but its dimensions are designed in order to keep a minimum clearance between the neck and the screen, thus guaranteeing the stability and the correct positioning of this last one.

Connect the ion pump to the vacuum chamber with a short length and large diameter pipe in order to retain as much pumping speed as possible. Proceed as follows:

1. Lift and support conveniently the ion pump; always use four support points or eyebolts at the same time, as described in the installation procedure.
2. Inspect the mating flanges for cleanliness and absence of scratches on the knife edge.
3. Place a new copper gasket between pump flange and vacuum chamber flange.
4. Bolt mating flanges of the pump to the chamber with new screws. For flanges over NW 35 (2.75" o.d.) also mount washers below the nuts and the screw heads.
5. Use silver-plated screws or apply high temperature lubricant to the screw threads. Lubrication simplifies sealing and disassembly. A recommended lubricant is Fel-Pro C-100. Take care in order to not contaminate the internal surface of the pump or the vacuum system with the lubricant.

NOTE If the screws are not silver-plated, lubrication is essential to prevent galling of the nut and screw after bakeout. Take care in order to not contaminate with lubricant the surfaces exposed to vacuum.

6 Attach the nuts and tighten each one to 6 – 11 Nm (4.5 - 8 ft.-lbs) of torque. After tightening a nut, always tighten the opposite nut with respect to the center of the flange. This will partially close the gap between the flange faces.

7 Repeat the sequential tightening for two more cycles.

8 Continue tightening the bolts until the flange faces meet and a pronounced increase in torque is felt.

Note that it is possible to install the screws also from the lower side, even if in some positions this may be uncomfortable. If for any reason screws cannot be installed neither from the upper side, studs must be used (see Fig. 17).

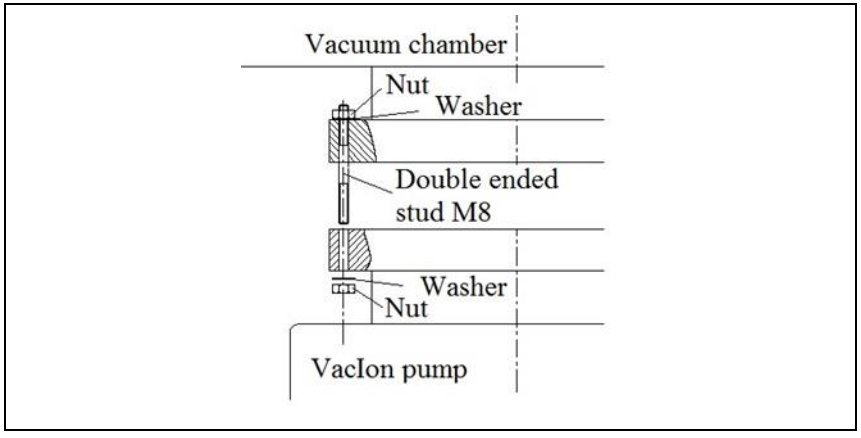

Figure 17 Stud mounting.

Control Unit Connection

WARNING!

The high voltage in the high voltage cable which connects the control unit to the ion pump, can cause severe injury or death. Before connecting the high voltage connector of the cable on the pump high voltage feedthrough, or before removing it, be sure that the main power is removed from the control unit.

WARNING!

To avoid injury, never connect the high voltage to the pump before it is installed into the system and all the inlet flanges are properly connected or blanked off. Make sure that the pump is well connected to the grounded vacuum system.

WARNING!

Before removing the high voltage connector of the cable from the control unit, be sure that the main power is removed from the control unit. Wait at least 10 seconds after removing the main power from the control unit, to allow capacitors to discharge completely.

To disconnect the coaxial high voltage cable from the controller, slide the safety locking sleeve (very little sleeve travel is required) from the control unit and at the same time pull on the male end of the cable connector to remove it from the socket on the control unit.

Safety Interlock

The VacIon Plus pump feedthrough in conjunction with the cable P/N 9290705, 0707, 0708 and 0709, when used with the Agilent control units, allows the operation of the “High Voltage Cable Safety Interlock” feature.

When the high voltage cable connector is disconnected from the VacIon Plus pump feedthrough, the high voltage is automatically switched off by the control unit.

Heater Installation

The heating element (Fig. 18) is composed by two plates to be fixed to the pump body. Two heating elements per pump must be installed (four plates in total).

NOTE It is suggested to make a 10 – 15 minutes of initial operation of the heater in a ventilated room to allow the evaporation of residual internal alloying elements.

To install the heating elements, proceed as follows (Fig. 19):

1. Before removing the covers and the pole piece, mark the position and orientation for an easier assembly later on.
2. Place the smaller plate (1) into the guides on the longest pump side. Be sure that the written side of the heating plate is towards you. Once the plate is positioned, gently press the bottom edges of the guides in order to block the plate in its vertical position.
3. Place the other heating plate (2) at the bottom of the pockets on the shortest side of the pump, by inserting the four studs welded at the bottom of the pockets into the holes of the plate. Be sure that the written side of the heating plate is towards you.
4. Reinstall the pole piece.
5. Place the connection box (3) on the upper side of the pump, between to the two feedthroughs, and fix it to the pump case.

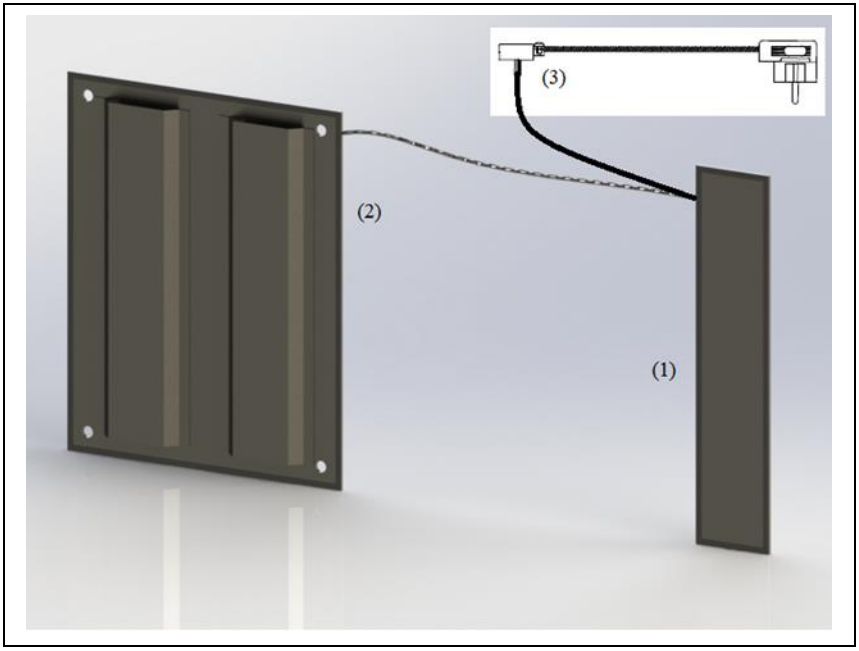

Figure 18 Heater, composed by two plates, (1) and (2), plus a connection box (3).

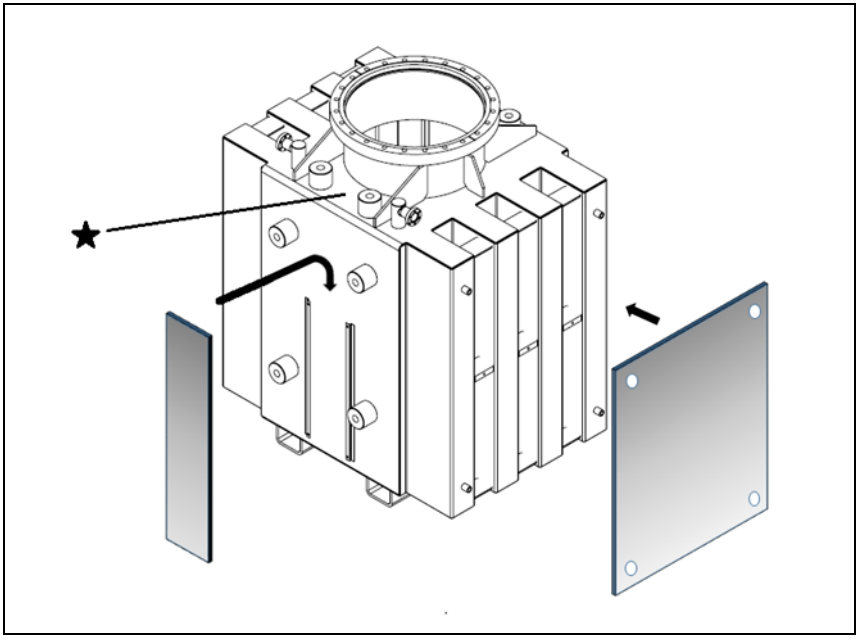

Figure 19 Heating element installation. The star indicates the location for the connection box. Two heating elements per pump must be installed (four plates in total).

Heater Replacement

Heater replacement can be performed only when the heater is at room temperature. To replace the heater element, proceed as follows:

1. Disconnect the pump from the high voltage.
2. Disconnect the heater elements from the main supply.
3. After removing the pump covers and the pole piece, disconnect the heater plates from the pump case.
4. Disconnect the heater connection box from the top plate of the pump.
5. Install the new heaters as described in the paragraph “Heater Installation”.

Bakeout Operation

For every ultra-high vacuum (UHV) application, it is necessary to bake the whole vacuum system in order to reach the ultimate pressure. This is done by heating the pump and all the components in the system, and is generally required to quickly achieve base pressure less than 1E-8 mbar.

CAUTION! Do not exceed the temperature limits reported in Table 1.

Note that it is possible to perform the bakeout in two ways, that is to say with the ion pump on or off. In the first case (bakeout with the ion pump on):

1. Heat the pump body and the vacuum system to temperatures between 150 °C and 220 °C (220 °C is the maximum allowable for most bakeable high voltage cables). This temperature is high enough to degas the pump surfaces of water vapor without damaging the magnet and high voltage connector. Note that the system components must be compatible with the bakeout temperature. The heating must be approximately even on all surfaces or evaporated water will condense on the colder surfaces resulting in an incomplete bakeout and preventing achievement of UHV vacuum pressure.
2. Monitor the pump current on the control unit. Agilent recommends that current during the bakeout should not exceed 25 mA; if this value is exceeded, turn the bakeout off and then on again when low current is restored. An automatically controlled relay may be used to control the heaters and to monitor the current limit during the bakeout in automatic mode.
3. Bake the VacIon Plus pump for at least 24 hours. Longer bakeout periods are recommended when the pump has been used with heavy gas loads or when UHV pressure (1E-9 mbar or less) is desired.

4 As the pump and the system cool down to room temperature, a drop in pressure should be observed.

In the second case (bakeout with the ion pump off), an external turbo pump, connected to the system through a bakeable isolation valve, is necessary. The ion pump should be switched on when the system is still at the bakeout temperature, then the turbo pump should be insulated and the system should be kept at high temperature for the final part of the bakeout process, until the ion current begins to decrease. It is worth noticing that this second method gives the best vacuum performance, since the outgassed species are not sorbed by the ion pump (inside which they will remain), but they are removed from the vacuum system by the turbomolecular pump. This helps to preserve the ion pump lifetime.

NOTE It is strongly recommended to degas filaments (e.g. in gauges or residual gas analyzers) when the system is at high temperature. If they are outgassed at room temperature, this operation will compromise the effectiveness of the bakeout.

Bakeout of VacIon Pump with the Integral Heaters

1 The integral heaters are to be powered with the appropriate voltage. Please refer to the inscription on the heaters to apply the correct voltage.

2 The integral heaters are designed to provide in every point of the ion pump a minimum temperature in the range 150-200°C, if the pump is wrapped in a 3-fold aluminum foil.

NOTE Keep the high voltage cable out of the aluminum foils in order to not exceed the temperature limits reported in Table 1.

3 Bakeout the VacIon pump for 24 hours. If the pump is used in heavy gas load applications, it is recommended to bakeout the pump for a longer period.

4 Wait until the pump cools down to room temperature and recovers its base pressure before using it in the application.

WARNING! **Do not touch the heaters and the ion pump during the heating and cooling phases. The high temperature may cause serious damage.**

NOTE It is worth noticing that the bakeout of the ion pump alone is not sufficient to achieve the ultimate pressure. The complete vacuum system must be baked according to the indications in the paragraph “Bakeout operation”.

Operating Procedure

1. Using a clean roughing pump, evacuate the system to the suggested starting pressure (or lower), as stated in the technical specification. To reach this pressure the use of an oil free turbo-molecular roughing pump is recommended.
2. When starting the ion pump, a slight pressure increase is normal, since the internal components are heated and outgassed. Leave the roughing pump connected to the system while starting the ion pump. This will make the startup faster and easier.
3. Connect the ion pump control unit to a suitable power source and switch the controller on.
4. Switch on the high voltage and observe the current and voltage behaviour on the controller display. The fastest starting is obtained using a high applied voltage (e.g. 7 kV). The applied voltage may be reduced later, when the pressure will be lower, in order to optimize the pumping speed. This operation is done automatically by Agilent controllers when set in “STEP” mode.
5. If the ion pump has been started at too high pressure, typically the voltage will be of some hundreds Volts. If the voltage remains constant at these values, in order to avoid pump overheating we suggest to turn it off and start it again at a lower pressure (see the paragraph “Use”). If the ion pump is started at the suggested pressure, the voltage will quickly increase to full voltage as the pump starts operating. The current will start at several milliamps and slowly decrease to microamps or nanoamps as low vacuum pressure is achieved.
6. When starting the ion pump for the first time, if the voltage decreases instead of increasing, switch off the ion pump, keep the roughing pump running and start the ion pump again after a while.
7. When the pump reaches its full operating voltage, the roughing valve can be closed.
8. If the pump does not start after 30 minutes of pumping, see the section PUMP TROUBLESHOOTING.

9 Once the pump reaches its base pressure with stable voltage and current, the ion pump and the system may be baked at high temperature as per the indications in the section titled BAKEOUT OPERATION.

10 To stop the ion pump, simply switch off the high voltage. The pump surfaces will continue to pump for a few minutes depending on the system pressure.

11 When venting the pump use clean, dry nitrogen. This will avoid water absorption on the pump surfaces and make subsequent pump downs easier. Wait that the ion pump is at room temperature before exposing it at the atmospheric pressure.

Maintenance

WARNING!

The high voltage in the high voltage cable which connects the control unit to the ion pump, can cause severe injury or death. Before mounting the high voltage connector of the cable on the pump high voltage feedthrough, or before removing it, be sure that the main power is removed from the control unit. Before removing the high voltage connector of the cable from the control unit, be sure the main power is removed from the control unit. Wait at least 10 seconds after removing the main power from the control unit, to allow capacitors to discharge completely.

VacIon Plus pumps are maintenance free. In case of life time expiry or premature failure of the pump, please contact your nearest Agilent sales/service office for repair.

The VacIon Plus 1000 pumps are designed with replaceable high-voltage feedthrough(s) and pump elements.

Exchange of the Pumping Element

VacIon Plus 1000 pumps are designed to allow the replacement of the pumping elements through the ion pump flange.

Together with the replacement elements, you will receive the instructions to install them inside the ion pump.

For ordering information (part numbers and quantities to be ordered for each pump), please refer to the local Agilent Technologies representative.

Exchange of the High Voltage Feedthrough

CAUTION! The high voltage feedthrough contains a ceramic insulator that can be damaged if excessive force is applied in torque, in bending, or in tension. When installing or removing the feedthrough, the applied torque should not exceed 2 Nm. Rotate the feedthrough gently when making the threaded connection to avoid excessive force.

1. Remove the 6 bolts of the Mini-ConFlat flange connection (see Fig. 20).
2. Remove the cable connection disc (if present, depending on the feedthrough type).
3. Gently relieve the feedthrough from the metal gasket connection and turn the feedthrough counterclockwise until it is completely detached from the internal high voltage threaded connection.
4. Replace the feedthrough and the copper gasket, making sure that the feedthrough is connected to the pumps internal connector. Check that the feedthrough is not shorted. Put the ion pump and the system under vacuum following the instructions in the paragraph “Operating Procedure”.

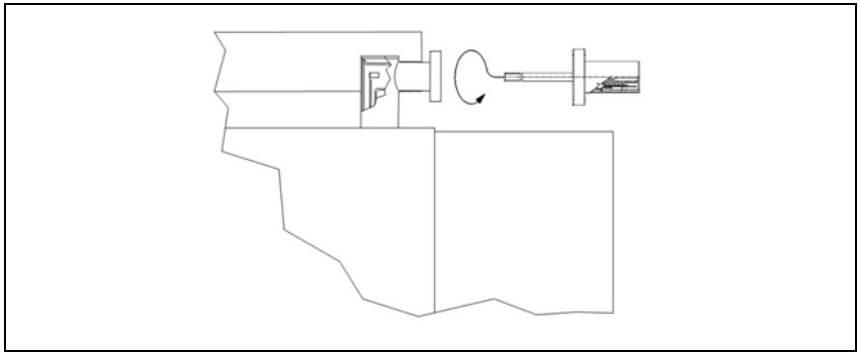

Figure 20 High voltage feedthrough connection.

Leakage Current Check

If the pump current reading is used as a pressure measurement, it is worth checking the pump leakage current as follows:

1. Turn off the pump control unit.
2. Remove the pump pole piece (magnetic circuit). Contact the local Agilent Technologies representative to get indication about how this operation should be carried out.
3. Turn on the pump control unit and wait for current stabilization. The current reading should not be higher than 500 nA. Make sure that the control unit and the high voltage cable leakage current is negligible.
4. If the reading is higher than 500 nA, this indicates that leakage current comes from the pump; in this case you should perform a "high-potting" per the following procedure, then recheck the pump and re-install the pole piece.
5. If it is not possible to "high-pot" the pump, the pressure reading is biased by the leakage current value.

If, for any reason, it is not possible to remove the pole piece, the presence of leakage current can be evaluated by changing the high voltage applied to the ion pump from 7 kV to 3 kV. This reduces exponentially the leakage current, thus confirming that the current reading is affected by leakage.

High-potting

A constant pump current when no vacuum leak exists is often caused by field emission currents which prevent the use of the pump current as a UHV pressure indicator. To reduce this field emission current, "high-potting" should be performed. "High-potting" is the term used to describe the application of higher than normal operating voltage (8 kV AC, max. 50 mA) for the purpose of burning off "whiskers" (sharp edges) on the pump cathode.

High-potting should be done under vacuum and preferably without pump magnets installed (to reduce the drawn current).

High-potting must be done carefully and in voltage steps since uncontrolled arcing inside the pump can cause permanent damage. Therefore slowly increase the applied voltage and watch the current meter for indication of arcing inside the pump as whiskers are burned away. If arcing occurs wait at this voltage until the current is stable again. Then slowly increase voltage again in steps up to a maximum voltage. The maximum voltage may be applied to the pump for a period of about 15 seconds. This should effectively remove any "whiskers" or sharp edges on the pump cathode.

WARNING! **Voltages developed in the high-potter power supply are potentially lethal. Use caution during operation and ensure the correct grounding.**

Pump Troubleshooting

Tab. 2

Symptom	Possible cause	Correction procedure
1) – Slow starting	Starting vacuum pressure too high.	Reduce the starting pressure to the value recommended in Table 1.
2) – Slow starting (more than 30 minutes).	Air leaks which limit pressure to above 10^{-6} mbar and cause longer starting time.	Leak check the vacuum system with a helium leak detector.
3) – Slow pump-down due to long exposure of viton parts to air.	Viton releases considerable gas after long exposure to air. (e.g. A bell-jar system which reached 2 x 10^{-8} mbar in 24 hours after 30 minutes air exposure, will only reach 1 x 10^{-7} mbar in 24 hours after 20 hours air exposure)	With the system under vacuum, pump for several days, or bake at 100-150 °C (minimum) for up to 15 hours.
4) – Slow pump-down due to absorption of vapours on pump and system walls.	Vapours and gases admitted to a system are absorbed on the walls of the system and pump. Subsequent reduction in pressure depends on the rate of depletion of this vapour. Heavy hydrocarbons are most troublesome because of their relative low vapour pressure and they are very difficult to remove, even by baking.	Bake the system walls, thereby accelerating the desorption process. Baking mobilizes the vapours so they can be cracked and pumped by discharge (see the section “BAKEOUT OPERATION”).
5) – Slow starting or slow pump-down.	High voltage feedthrough is leaking.	Replace the feedthrough.
6) – Current higher than expected at any given pressure.	Ion pump leakage current causing higher pressure reading.	Verify that leakage current (see the dedicated paragraph) occurs and then high-pot the pump.
7) – System fails to achieve desired UHV vacuum pressure.	System not fully baked. Water vapor limits the base pressure.	Bake the system walls, thereby accelerating the desorption process. Baking mobilizes the vapours so they can be cracked and pumped by discharge (see the section “BAKEOUT OPERATION”).

Symptom	Possible cause	Correction procedure
8) – System fails to achieve desired UHV vacuum pressure.	System not appropriately cleaned for UHV. Excessive outgassing from walls limits base pressure.	Clean all components for UHV and bake the system again.
9) – System fails to achieve desired UHV vacuum pressure	The pressure indication is not given by a gauge, but it comes from the conversion of the ion pump current, that may be affected by leakage.	Verify that leakage current occurs (see the dedicated paragraph) and then high-pot the pump.
10) Sudden and unexplained pressure (current) increases take place with regular frequency.	Instability for noble gases occurs. It is worth noticing that a small quantity of noble gas (argon) is present in the air composition.	Bake the ion pump and the system with the ion pump off and a turbomolecular pump as support. This should partly remove the noble gases inside the ion pump. Choose the most appropriate pumping element for noble gases (StarCell is recommended).

Accessories and Spare Parts

Tab. 3

Description	Part number
Vaclon Plus 1000 pump, Diode, one feedthrough, without heaters	X3604-64000
Vaclon Plus 1000 pump, StarCell, two feedthroughs, equipped with heaters 230V	X3604-64020
For part numbers with other feedthrough or heater configurations, please refer to your local Agilent representative.	
Cables and heaters	
HV radiation resistant cable, 4 m (13 ft), with interlock (for Fischer feedthrough)	9290705
HV radiation resistant cable, 7 m (23 ft), with interlock (for Fischer feedthrough)	9290707
HV radiation resistant cable, 10 m (33 ft), with interlock (for Fischer feedthrough)	9290708
HV radiation resistant cable, 20 m (66 ft), with interlock (for Fischer feedthrough)	9290709
Heaters 115V (two items per pump)	X3604-68000
Heaters 230V (two items per pump)	X3604-68001
Fischer feedthrough	9595125
Replacement pumping element Diode (16 per pump)	9199040
Replacement pumping element Diode (16 per pump)	9199030

For a complete overview of Agilent extensive vacuum product line and for part numbers not included in the above table please refer to the Agilent Vacuum Catalogue.

VacIon Plus Pump Controllers

The following controller series are available to supply the VacIon Plus pumps:

- 4UHV Controller

Please refer to the Agilent Vacuum Catalogue to choose the correct controller (polarity and power) for each pump.

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.)

Agilent Technologies

Agilent Technologies

Vacuum Products Division
Instructions for returning products

Dear Customer,

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

Complete the attached **Request for Return form** and send it to Agilent Technologies (see below), taking particular care to include the completed **Health and Safety** declaration Section. No work can be started on your unit until we receive a completed copy of this form.
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).

Product preparation

- Remove all accessories from the core product (e.g. inlet screens, vent valves).
- Prior to shipment and if applicable for your product, 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.
- Include a copy of the Health and Safety Declaration in the shipping documentation on the outside of the shipping box of your returning product.
- 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.
- Return only products for which the RA was issued.

Shipping

- 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.
- Return shipments must comply with all applicable Shipping Regulations (IATA, DOT, ADR, etc.) and carrier requirements.

RETURN THE COMPLETED **REQUEST FOR RETURN** FORM TO YOUR NEAREST LOCATION:

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Fax Free: 00 800 345 345 00
Toll Free: 00 800 234 234 00
vpt-customercare@agilent.com

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vpl-ra@agilent.com

PACIFIC RIM:
please visit our website for individual office information
http://www.agilent.com

TERMS AND CONDITIONS

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.

- Unless otherwise pre-negotiated, 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.
- Agilent Technologies is not responsible for returning customer provided packaging or containers.
- 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.
- Products returned that have not been drained from oil will be disposed.
- A Special Cleaning fee will apply to all exposed products
- If requesting a calibration service, units must be functionally capable of being calibrated.

Agilent Technologies

Vacuum Products Division
Request for Return Form

Customer information		
Company :	Contact Name:	
Address:	Tel:	Fax:
	Email:	

Equipment			
Product description	Agilent PartNo	Agilent Serial No	Original Purchasing Reference
Failure description		Type of process (for which the equipment was used)	

Type of return

☐ Non Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form): _____

☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

Health and safety

The product has been exposed to the following substances:
(by selecting 'YES' you MUST complete the table to the right)

Substances (please refer to MSDS forms)

* Agilent will not accept delivery of any product that is exposed to radioactive, biological, explosive substances or dioxins, PCB's without written evidence of decontamination.

		Trade name	Chemical name	Chemical Symbol	CAS Number
Toxic	☐ YES ☐ NO				
Harmful	☐ YES ☐ NO				
Corrosive	☐ YES ☐ NO				
Reactive	☐ YES ☐ NO				
Flammable	☐ YES ☐ NO				
Explosive (*)	☐ YES ☐ NO				
Radioactive (*)	☐ YES ☐ NO				
Biological (*)	☐ YES ☐ NO				
Oxidizing	☐ YES ☐ NO				
Sensitizer	☐ YES ☐ NO				
Other dangerous substances	☐ YES ☐ NO				

Goods preparation

If you have replied YES to one of the above questions. Has the product been purged? ☐ YES ☐ NO
If yes, which cleaning agent/method:

Has the product been drained from oil? ☐ YES ☐ NOT APPLICABLE
I confirm to place this declaration on the outside of the shipping box. ☐

I declare that the above information is true and complete to the best of my knowledge and belief.
I understand and agree to the terms and conditions on page 2 of this document.

Name:	Authorized Signature:
Position:	
Date:	

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.

Agilent Vacuum Products Division/Sales and Service Offices

United States
Agilent Technologies
121 Hartwell Avenue
Lexington, MA 02421 - USA
Ph. +1 781 861 7200
Fax: +1 781 860 5437
Toll-Free: +1 800 882 7426
vpl-customercare@agilent.com

Netherlands
Agilent Technologies Netherlands B.V.
Customer Contact Center
Laan van Langerhuize 1, toren A-8
1186 DS Amstelveen
Tel. +31 020 547 2600
Fax +31 020 654 5748
customercare_netherlands@agilent.com

Belgium
Agilent Technologies Belgium S.A./N.V.
Customer Contact Center
Pegasus Park
De Kleetlaan 12A bus 12
B-1831 Diegem
Tel. +32 2 404 92 22
Fax +32 2 626 46 30
customercare_belgium@agilent.com

Brazil
Agilent Technologies Brasil
Avenida Marcos Penteado de Ulhoa
Rodrigues, 939 - 6° andar
Castelo Branco Office Park
Torre Jacarandá - Tamboré
Barueri, Sao Paulo CEP: 06460-040
Toll free: 0800 728 1405

China
Agilent Technologies (China) Co. Ltd
No.3, Wang Jing Bei Lu, Chao Yang District
Beijing, 100102, China
Tel: +86 (0)10 64397888
Fax: +86 (0)10 64392765
Toll free: 800 820 6778 (ph); 400 820 6778 (cell.ph.)
vacuum.cnmarketing@agilent.com
vpc-customerservice@agilent.com

France
Agilent Technologies
Parc Technopolis - Z.A. de Courtaboeuf
3, avenue du Canada - CS 90263
91978 Les Ulis cedex, France
Tel: +33 (0) 1 64 53 61 15
Fax: +33 (0) 1 64 53 50 01
vpf.sales@agilent.com

Southeast Asia
Agilent Technologies Sales Sdn Bhd
Unit 201, Level 2 uptown 2,
2 Jalan SS21/37, Damansara Uptown
47400 Petaling Jaya, Selangor, Malaysia
Ph. +603 7712 6181
Fax: +603 7727 1239
Toll free: 1 800 880 805
vps-customerservice@agilent.com

India (Sales)
Agilent Technologies India Pvt. Ltd.
Unit Nos 110- 116, & Part of 101 & 109
First Floor, Splendor Forum,
Plot No.-3 , District Centre, Jasola
New Delhi-110025
Ph. +91 11 4623 7100
Fax: +91 4623 7105
Toll Free: 1 800 180 1517

Italy
Agilent Technologies Italia S.p.A.
Via F.lli Varian, 54
10040 Leini, (Torino) - Italy
Tel: +39 011 9979 111
Fax: +39 011 9979 350
Toll free: 00 800 234 234 00
vpt-customerservice@agilent.com

Japan
Agilent Technologies Japan, Ltd.
9-1 Takakura-cho Hachioji-city,
Tokyo, Japan
Tel.: +81- 3-5232-1253
Fax: +81-120-565-154
Toll-Free: +81-120-477-111
jp-vvt-sales.pdl-ext@agilent.com

Singapore
Agilent Technologies Singapore Pte. Ltd,
1 Yishun Avenue 7,
Singapore 768923
Tel : (65) 6215 8045
Fax : (65) 6754 0574
Toll free: 1 800 2762622
vps-customerservice@agilent.com

Korea
Agilent Technologies Korea, Ltd.
Ilshin Builiding 4F
Yongsan-gu Hannam-daero
Seoul Korea 04418
Tel: +82 (0)2 2194 9449
Fax: +82 (0)2 2194 9853
Toll free: 080 222 2452
vpk-customerservice@agilent.com

UK and Ireland
Agilent Technologies LDA UK Limited
Lakeside Cheadle Royal Business Park
Cheadle, Cheshire SK8 3GR,
United Kingdom
Ph. +44 01865291570
Fax +44 01865291571
Toll free: 00 800 234 234 00
Toll free fax: 00 800 345 345 00
vpt-customercare@agilent.com

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Agilent Technologies

India (Service)
Agilent Technologies India Pvt. Ltd.
C-Block, RMZ Centennial Plot Number- 8A, 8B, 8C, 8D,
Doddanakundi Industrial Area, ITPL Road,
Mahadevapura Post, Bangalore- 560048
Ph. +91 80 40614000
Fax: +91 80 40148991

Taiwan
Agilent Technologies Taiwan Limited
No. 20 Gao-shuang Road, Ping-zhen Dist
Tao-Yuan City
32450 Taiwan, R.O.C.
Tel: +886 3 4959004
Toll free: 0800 018 768
vpw-customerservice@agilent.com

Germany and Austria
Agilent Technologies
Sales & Services GmbH & Co. KG
Lyoner Str. 20
60 528 Frankfurt am Main
GERMANY
Tel: +49 69 6773 43 2230
Fax: +49 69 6773 43 2250

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

Other Countries
Agilent Technologies Italia S.p.A.
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
vpt-customercare@agilent.com

Customer Support & Service
NORTH AMERICA:
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vpl-ra@agilent.com
Lexington-service@agilent.com

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