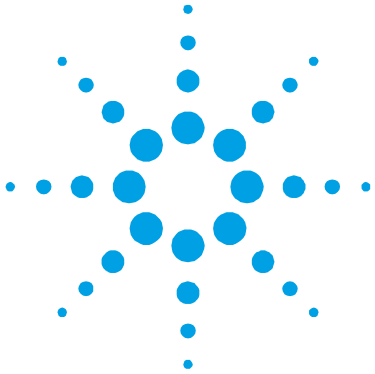

Agilent 4UHV Ion Pump Controller

Models
829-9010, 829-9011, 829-9020, 829-9021, 829-9022, 829-9101, 829-9200, 829-9201, 829-9210, 829-9211, 829-9212, 829-9213, 829-9400, 829-9401, 829-9402, 929-9010, 929-9011, 929-9020, 929-9021, 929-9022, 929-9101, 929-9200, 929-9201, 929-9210, 929-9211, 929-9212, 929-9213, 929-9400, 929-9401, 929-9402

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

87-900-137-01 (C)
01/2012

Agilent Technologies

Notices

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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.

4UHV Ion Pump Controller

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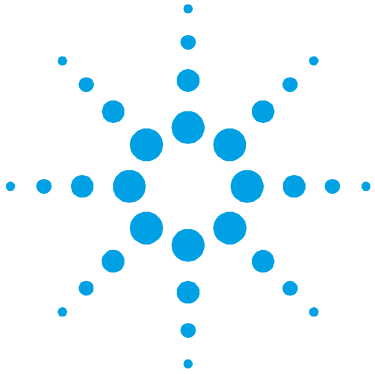

1 Istruzioni per l'uso

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Traduzione delle istruzioni originali

Informazioni Generali

Questa apparecchiatura è destinata ad uso professionale. L'utente deve leggere attentamente il presente Manuale di istruzioni ed ogni altra informazione addizionale fornita dalla Agilent prima dell'utilizzo dell'apparecchiatura. La Agilent declina ogni responsabilità dovuta alla mancata osservanza totale o anche parziale delle istruzioni fornite in questo documento, all'uso improprio dell'apparecchiatura da parte di personale non addestrato, all'esecuzione di interventi non autorizzati o alla mancata osservanza delle specifiche normative nazionali.

Nei paragrafi seguenti sono riportate tutte le informazioni necessarie a garantire la sicurezza dell'operatore durante l'utilizzo dell'apparecchiatura. Nel appendice "Technical Information" vengono fornite delle informazioni dettagliate.

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.

Immagazzinamento

Per trasportare e immagazzinare il controller occorre osservare le seguenti condizioni ambientali:

- Temperatura: da -20 °C a +70 °C
- Umidità relativa: da 0 a 95% (senza condensa)

Preparazione per l'installazione

Il controller viene fornito in un imballo protettivo speciale; nel caso in cui si presentassero segni di danni che potrebbero essere stati causati durante il trasporto, contattare l'ufficio vendite locale.

Durante l'operazione di disimballo, prestare particolare attenzione a non lasciar cadere il controller e a non sottoporlo ad urti.

Il materiale dell'imballo è completamente riciclabile e risponde alla direttiva CEE 85/399 per la tutela dell'ambiente.

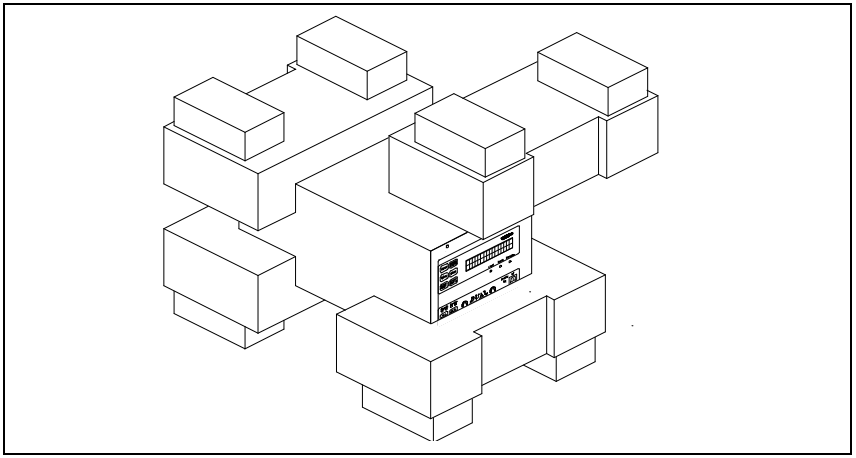


Figura 1 Imballo del controller

Installazione

AVVERTENZA!

Per la sicurezza dell'operatore il controller 4UHV deve essere alimentato con un cavo di alimentazione a 3 fili dotato di una spina approvata a livello internazionale. Utilizzare questo cavo e spina insieme ad una presa adeguatamente connessa a terra per evitare scosse elettriche e soddisfare i requisiti delle norme CE. Le alte tensione che si sviluppano nel controller possono provocare gravi lesioni o la morte.

Dopo lo spegnimento dell'unità rimane dell'energia residua all'interno del controller per un po' di tempo.

Attendere circa 1 minuto per essere sicuri che l'energia residua sia stata dissipata.

ATTENZIONE!

Il controller può essere utilizzato sia come unità da tavolo che come modulo installato in un rack. In ogni caso deve essere posizionato in modo tale che l'aria possa circolare liberamente attraverso i fori di areazione presenti sulla copertura.

Nel caso in cui il controller viene utilizzato come modulo rack, DEVE essere installato in un'adattatore alto quattro unità rack per evitare che cada all'interno del rack stesso (vedere la tabella delle parti ordinabili). Il pannello frontale del controller 4UHV non è previsto per reggere il peso dell'unità.

Non installare o utilizzare il controller in ambienti esposti ad agenti atmosferici (pioggia, neve, ghiaccio), nella presenza di polvere, gas corrosivi o in ambienti esplosivi o ad alto rischio di infiammabilità.

ATTENZIONE! Il controller 4UHV appartiene alla seconda categoria di installazione (o sovratensione) prevista dalla normativa EN 61010-1. Connettere quindi il dispositivo ad una linea di alimentazione che soddisfi tale categoria.

Il controller 4UHV ha dei connettori per gli ingressi/uscite e per la comunicazione seriale che devono essere connessi ai circuiti esterni in modo che nessuna parte sotto tensione sia accessibile. Assicurarsi che l'isolamento del dispositivo connesso al controller 4UHV abbia un isolamento adeguato anche in condizione di guasto singolo come previsto dalla normativa EN 61010-1.

NOTA Nel caso in cui il controller viene installato in un rack, rimuovere i quattro piedini in modo che venga posizionato con almeno 30 mm di spazio sotto e sopra.

ATTENZIONE! In casi rari di guasto il controller potrebbe emettere fumo. Se il cliente usa il controller in camere pulite è necessario prevedere adeguate protezioni per evitare di contaminare l'ambiente con l'eventuale fumo.

Durante il funzionamento, occorre che siano rispettate le seguenti condizioni ambientali:

- Temperatura: da 0 °C a +40 °C
- Umidità relativa: 0 – 90 % (senza condensa)

Uso

In questo paragrafo vengono riportate le principali procedure operative. Per ulteriori informazioni e per le procedure riguardanti collegamenti o particolari opzioni fare riferimento al paragrafi "UTILIZZO" nell'appendice "Technical Information".

Prima di utilizzare il controller effettuare tutti i collegamenti elettrici e fare riferimento al manuale della pompa collegata.

AVVERTENZA!

Accendere i canali di alta tensione solo se connessi alle pompe ioniche tramite gli appositi cavi di alta tensione dotati del cavo di interlock.

L'uso del controller è inteso con cavo di alta tensione provvisto di interlock.

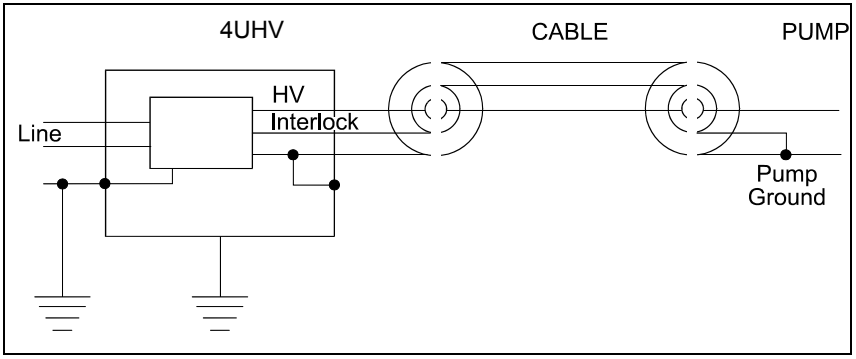


Figura 2 Collegamenti delle masse

NOTA Se si vuole utilizzare un cavo HV senza interlock nel sacchetto accessori è fornito un apposito kit di cavetti per interlock preassemblati. Con questo utilizzo si perde la funzionalità di sicurezza offerta dall'utilizzo dell'interlock.

Fare riferimento alla seguente figura per montare correttamente il cavo di interlock fornito nel sacchetto accessori, qualora si voglia rinunciare al cavo di alta tensione dotato di interlock.

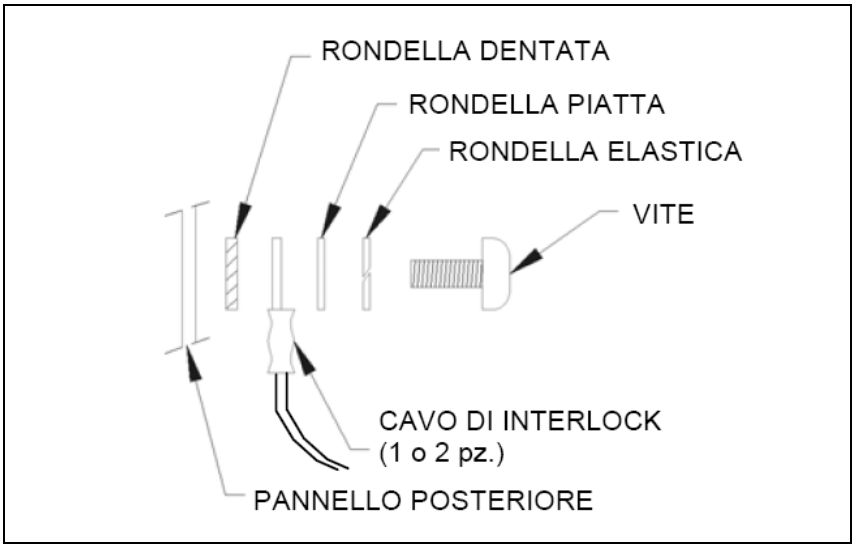


Figura 3

NOTA L'interlock del cavo viene chiuso sulla massa della pompa. Se il collegamento è interrotto l'alta tensione viene disabilitata.

L'interlock del cavo viene chiuso sulla massa della pompa. Se il collegamento è interrotto l'alta tensione viene disabilitata. Per collegare il controller alla pompa, utilizzare un cavo HV dotato di interlock (vedere nelle parti ordinabili).

Nella figura "Collegamenti delle masse" sono riportati i corretti collegamenti delle masse, del cavo HV tra il controller e la pompa e del cavo di interlock.

ATTENZIONE! Se si monta il cavo di interlock fornito nel sacchetto accessori fare molta attenzione affinchè nessuna parte cada accidentalmente all'interno del controller.

Accensione del controller dal pannello frontale (modalità LOCAL)

NOTA Per accendere l'alta tensione (HV) occorre che l'interlock del cavo HV (cable interlock) sia chiuso (connettore inserito).

Procedere come segue per alimentare il controller e abilitare la tensione sui connettori di alta tensione (H.V.):

- Spegnere il controller.
- Collegare il cavo HV e l'interlock del cavo H.V. nei relativi connettori sul pannello posteriore.
- Selezionare la modalità LOCAL premendo per breve tempo il tasto "MODE" fino a quando appare sul display la scritta LOCAL.
- Tenere premuto il pulsante HV ON/OFF (2) mentre si preme il pulsante HV-x (3,4,5,6) dove x è il numero del canale che si vuole accendere o spegnere.

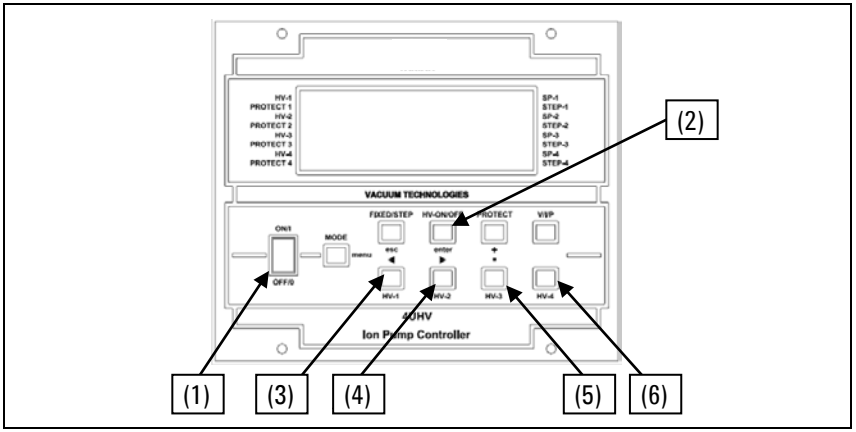


Figura 4 Front Panel 4UHV Ion Pump Controller

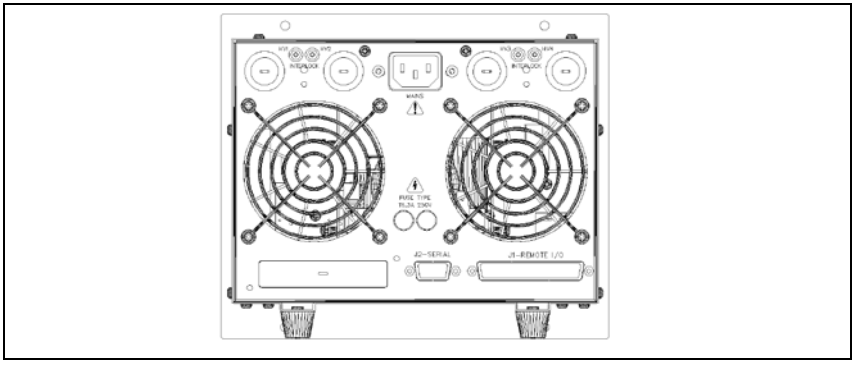


Figura 5 Rear Panel 4UHV Ion Pump Controller

Per spegnere i canali HV:

- Tenere premuto il pulsante HV ON/OFF (2) mentre si preme il pulsante HV-x (3,4,5,6) dove x è il numero del canale che si vuole accendere o spegnere.

Per ulteriori dettagli sull'uso del controller e sulla descrizione delle informazioni del display fare riferimento alla sezione "Technical Information".

AVVERTENZA! **In condizioni di emergenza per spegnere l'unità e tutti i canali alta tensione disattivare l'interruttore generale (1) posto sul pannello anteriore.**

Mettendo in off l'interruttore generale si spegnerà l'unita HV.

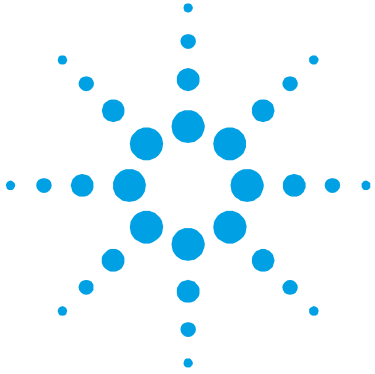
Manutenzione

Il controller 4UHV non richiede alcun intervento di manutenzione. Qualsiasi tipo di intervento sull'unità deve essere eseguito da personale tecnico autorizzato. In caso di guasto è possibile usufruire del servizio di riparazione Agilent o del "Agilent advanced exchange service", che permette di ottenere un controller rigenerato in sostituzione di quello guasto.

Qualora un controller dovesse essere rottamato, procedere nel rispetto delle normative nazionali specifiche.

Smaltimento

Significato del logo "WEEE" presente sulle etichette. Il simbolo qui sotto riportato è 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.



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Übersetzung der Originalanleitungen

Allgemeines

Dieser Apparat ist für Fachbetriebe bestimmt. Vor Gebrauch sollte der Benutzer dieses Handbuch sowie alle weiteren mitgelieferten Zusatzdokumentationen genau lesen. Bei Nichtbeachtung - auch teilweise - der enthaltenen Hinweise, unsachgemäßem Gebrauch durch ungeschultes Personal, nicht autorisierten Eingriffen und Missachtung der einheimischen, hier zur Geltung kommenden Bestimmungen übernimmt die Firma Agilent keinerlei Haftung.

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 bestimmte Vorgänge oder Praktiken, die bei unkorrekter Ausführung schwere Verletzungen hervorrufen können.

VORSICHT! Die Vorsichtshinweise vor bestimmten Prozeduren machen den Bediener darauf aufmerksam, dass bei Nichteinhaltung Schäden an der Anlage entstehen können.

HINWEIS Die HINWEISE enthalten wichtige Informationen, die im Text hervorgehoben werden.

Lagerung

Bei Transport und Lagerung der Controller müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: -20 °C bis +70 °C
- Rel. Luftfeuchtigkeit: 0-95 % (nicht kondensierend)

Vor der Installation

Der Controller wird mit einer speziellen Schutzverpackung geliefert. Eventuelle Transportschäden müssen sofort der zuständigen örtlichen Verkaufsstelle gemeldet werden.

Das Verpackungsmaterial muss korrekt entsorgt werden. Es ist vollständig recyclebar und entspricht der EG-Richtlinie 85/399 für Umweltschutz.

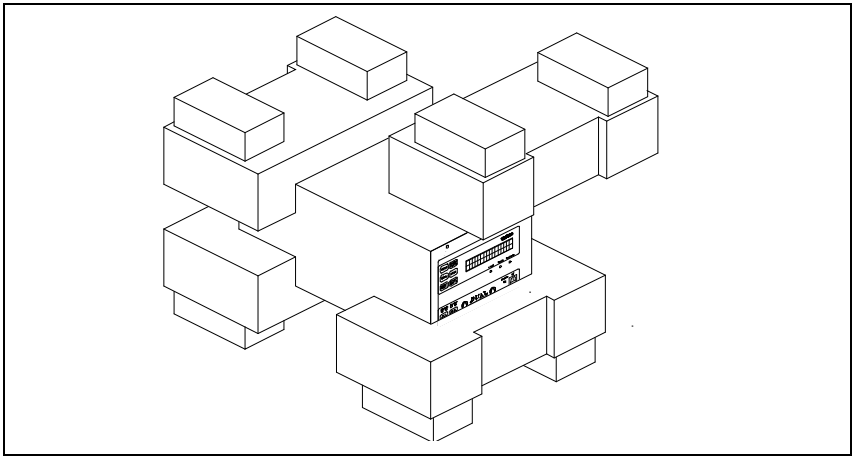


Abbildung 1 Verpackung des Controllers

Installation

WARNUNG!

Zur Sicherheit des Controller-Bedieners muss der 4UHV an ein 3-Draht-Speisekabel mit einem international anerkannten Stecker angeschlossen sein. Dieses Kabel und dieser Stecker müssen an eine angemessen geerdete Steckdose angeschlossen sein, um Stromschläge zu vermeiden und den Anforderungen der CE-Normen gerecht zu werden. Die Hochspannungen, die im Controller entstehen, können schwere Verletzungen oder den Tod verursachen.

Nach Ausschalten des Geräts bleibt noch einige Zeit lang Reststrom im Controller.

Warten Sie etwa 1 Minute, um sicher zu sein, dass der restliche Strom dissipiert ist.

VORSICHT!

Der Controller kann auf einen Tisch oder ein Gestell montiert werden. In beiden Fällen muß eine ungehinderte Zirkulation der Kühlluft durch die im Gehäuse vorne und unten eingelassen Luftöffnungen gewährleistet sein.

Wenn der Controller in einem Gestell montiert wird, MUSS er in einer vier Rackeinheiten hohen Adapter-Einheit installiert werden, um zu vermeiden, daß der Controller nicht in das Gestell fällt (siehe dazu Tabelle der bestellbaren Zubehörteile). Die vordere Schalttafel des 4 HV-Controllers ist nicht geeignet, das gesamte Gewicht der Einheit zu tragen.

Der Controller darf nicht in Umgebungen installiert u/o benutzt werden, die Witterungseinflüssen (Regen, Frost, Schnee), Staub und aggressiven Gasen ausgesetzt sind und in denen Explosions- und erhöhte Brandgefahr besteht.

VORSICHT! Der Controller 4UHV gehört zu der zweiten Einbaukategorie (oder auch Überspannung), die von der Norm EN 61010-1 geregelt ist. Schließen Sie daher das Gerät an eine Stromleitung an, die dieser Kategorie gerecht wird.

Der Controller 4UHV hat Anschlüsse für die Ein-/Ausgänge und die Serienkommunikation, die an externe Kreisläufe angeschlossen sein müssen, so dass man zu keinem unter Strom stehenden Teil Zugriff hat. Vergewissern Sie sich, dass die Isolierung des Gerätes, das an den Controller 4UHV angeschlossen ist, auch bei Einzelstörungen, wie sie von der Vorschrift EN 61010-1 vorgesehen sind, angemessen isoliert ist.

HINWEIS Wenn der Controller in einem Gestell installiert werden soll, müssen alle vier Füße abmontiert und über- und unterhalb wenigstens 30 mm (1,2 Zoll) Platz gelassen werden.

VORSICHT! In seltenen Fällen könnte der Controller bei Störungen Rauch ausstoßen. Wenn der Controller in sauberen Räumlichkeiten verwendet wird, muss er mit angebrachten Schutzvorrichtungen versehen werden, um zu verhindern, dass die Räumlichkeiten durch den Rauch verschmutzt werden.

Während des Betriebs müssen folgende Umgebungsbedingungen eingehalten werden:

- Temperatur: 0 °C to +40 °C
- Rel. Luftfeuchtigkeit: 0 - 90 % (nicht kondensierend)

Gebrauch

In diesem Kapitel sind die wichtigsten Betriebsvorgänge aufgeführt. Für weitere Hinweise bezüglich Anschluß und Montage des bestellbaren Zubehörs verweisen wir auf das Kapitel "Gebrauch" im Anhang zu "Technical Information". Vor Benutzung des Controllers müssen sämtliche elektrischen Anschlüsse ausgeführt und die Betriebsanleitung der angeschlossenen Pumpe durchlesen werden.

WARNUNG!

Schalten Sie die Hochspannungsleitungen erst ein, wenn diese mit Hilfe der dafür bestimmten Hochspannungskabel des Interlock-Kabels an die Ionenpumpen angeschlossen sind.

Der Gebrauch des Controllers muss unter Verwendung eines Hochspannungskabels mit Interlock erfolgen.

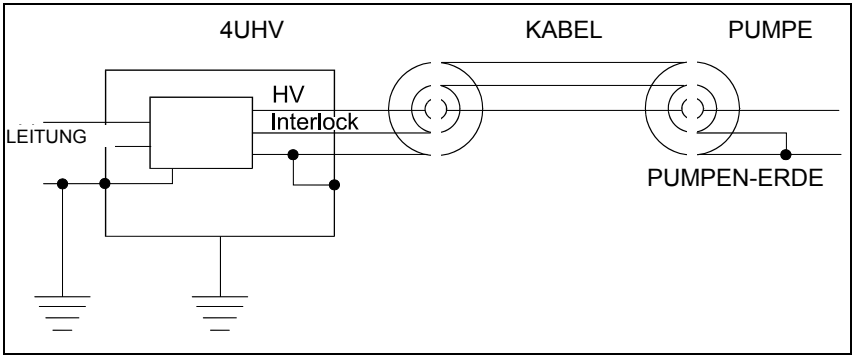


Abbildung 2 Erdung

WARNUNG!

Soll ein HV-Kabel ohne Interlock zum Einsatz kommen, befindet sich in dem Zubehörbeutel ein dafür bestimmtes Kabelset für vormontierte Interlock-Teile. Bei diesem Gebrauch geht die Sicherheitsfunktion verloren, die man bei der Interlock-Verwendung hat.

Sehen Sie sich folgende Abbildung genau an, um das im Zubehörbeutel mitgelieferte Interlock-Kabel richtig zu montieren, wenn auf das Hochspannungskabel mit Interlock verzichtet werden soll.

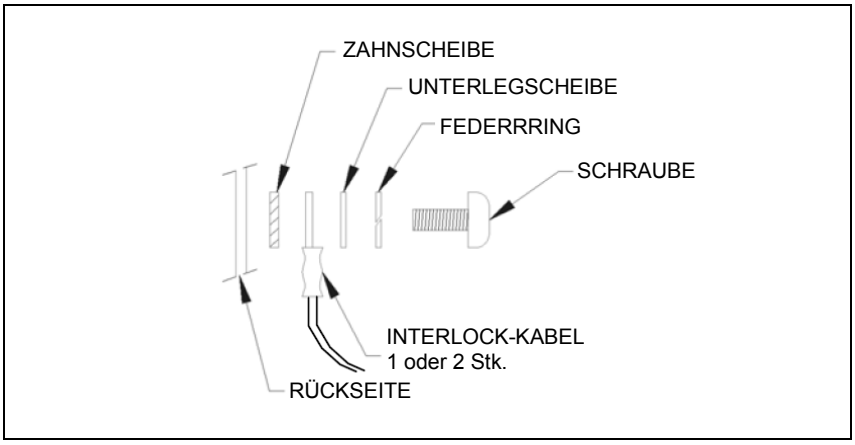


Abbildung 3

HINWEIS Die Verriegelung des Kabels wird auf der Masse der Pumpe geschlossen. Wenn die Verbindung unterbrochen wird, wird die Hochspannung deaktiviert.

Die Verriegelung des Kabels wird auf der Masse der Pumpe geschlossen. Wenn die Verbindung unterbrochen wird, wird die Hochspannung deaktiviert. Beim Anschluss des Controller an die Pumpe ist ein HV-Kabel mit Interlock (siehe Bestellteile) zu verwenden.

Auf der Abbildung “Anschlüsse” sind die richtigen Anschlüsse der Erdungen, des HV-Kabels des Controller an die Pumpe und des Interlock-Kabels ersichtlich.

VORSICHT! Beim Montieren des im Zubehörbeutel mitgelieferten Interlock-Kabels gehen Sie sehr vorsichtig vor, damit dabei kein Teil in den Controller fällt.

Einschalten des Controllers von der vorderen Schalttafel (LOKAL-Modus)

HINWEIS Um die Hochspannung (HV) einzuschalten, muss der Interlock des HV-Kabels (Kabel-linterlock) geschlossen sein (Verbinder eingesteckt).

Gehen Sie wie folgt vor, um den Controller mit Strom zu versorgen und die Spannung an den Hochspannungsverbindern (H.V.) freizugeben:

- Schalten Sie den Controller aus.
- Schließen Sie das HV-Kabel und den Interlock des H.V-Kabels an die jeweiligen Verbinder am Rückenteil.
- Wählen Sie die Modalität LOCAL, indem Sie kurz die Taste “MODE” drücken bis auf dem Display die Aufschrift LOCAL erscheint.
- Halten Sie die Taste HV ON/OFF (2)) gedrückt und drücken Sie gleichzeitig die Taste HV-x (3,4,5,6)), wobei x die Nummer der Leitung ist, die ein- oder ausgeschaltet werden soll.

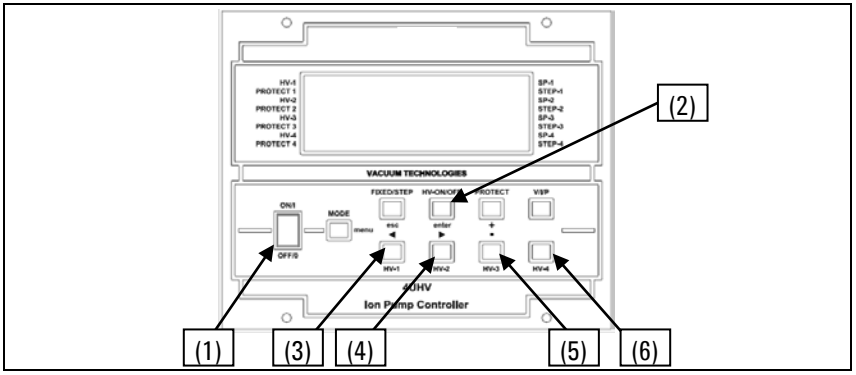


Abbildung 4 Vorderteil 4UHV Ionenpumpen-Controller

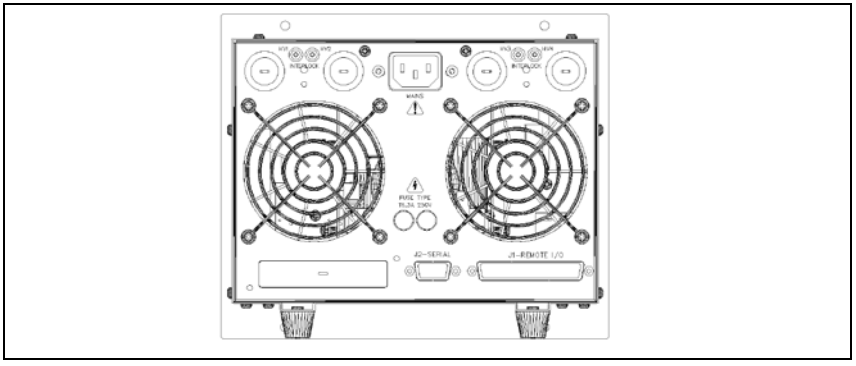


Abbildung 5 Rückenteil 4UHV Ionenpumpen-Controller

Um die HV-Leitungen auszuschalten:

- Halten Sie die Taste HV ON/OFF (2) gedrückt und drücken Sie gleichzeitig die Taste HV-x (3,4,5,6), wobei x die Nummer der Leitung ist, die ein- oder ausgeschaltet werden soll.

Weitere Einzelheiten zum Gebrauch des Controllers und zur Beschreibung der Display-Angaben entnehmen Sie bitte dem Abschnitt “ Technical Information ”.

WARNUNG! **Bei Not-Aus schalten Sie den Hauptschalter (1) auf dem vorderen Bedienfeld aus, um das Gerät und sämtliche Hochspannungsleitungen auszuschalten.**

Wenn Sie den Hauptschalter auf Off stellen, wird das HV-Gerät ausgeschaltet.

Wartung

Die 4UHV-Controller sind wartungsfrei. Eventuell erforderliche Eingriffe müssen von dazu befugtem Fachpersonal ausgeführt werden. Bei Störungen kann der Agilent-Reparaturdienst in Anspruch genommen werden oder schließen Sie einen Vertrag für “Agilent Advanced Exchange Service” ab, mit dem ein defekter Controller gegen einen general-überholten ausgetauscht wird.

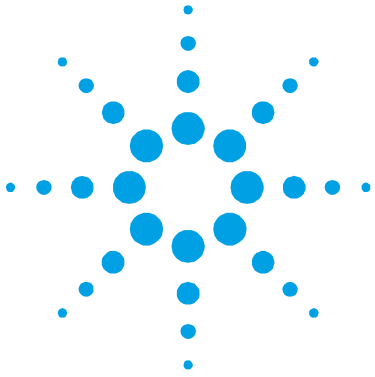
Eine eventuelle Verschrottung muß unter Einhaltung der einschlägigen landesüblichen Vorschriften erfolgen.

Entsorgung

Bedeutung des "WEEE" Logos auf den Etiketten.

Das folgende Symbol ist in Übereinstimmung mit der EURichtlinie 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.



3 Mode d'emploi

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Traduction de la mode d'emploi originale

Indications Generales

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 l'utilisation de l'appareillage. Agilent décline par conséquent toute responsabilité en cas d'inobservation totale ou partielle des instructions données, d'utilisation incorrecte de la part d'un personnel non formé, d'opérations non autorisées ou d'un emploi contraire aux réglementations nationales spécifiques.

Les paragraphes suivants donnent toutes les indications nécessaires à garantir la sécurité de l'opérateur pendant l'utilisation de l'appareillage. Des renseignements plus détaillés se trouvent dans l'appendice " 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 manoeuvre spéciale qui, si elle n'est pas effectuée correctement, risque de provoquer de graves lésions.

ATTENTION! Les messages d'attention apparaissent avant certaines procédures qui, si elles ne sont pas observées, pourraient endommager sérieusement l'appareillage.

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

Emmagasinage

Pour transporter et emmagasiner le contrôleur il faut observer les conditions suivantes d'environnement:

- température: de -20°C à +70°C
- humidité relative: 0 - 95 % (non condensante).

Preparation pour l'Installation

Le contrôleur est fourni dans un emballage de protection spécial; si l'on constate des dommages pouvant s'être produits pendant le transport, contacter tout de suite le bureau de vente local. Pendant l'opération d'ouverture de l'emballage, veiller tout particulièrement à ne pas laisser tomber le contrôleur et à ne lui faire subir aucun choc. Le matériel est entièrement recyclable et il est conforme aux directives CEE 85/399 en matière de protection de l'environnement.

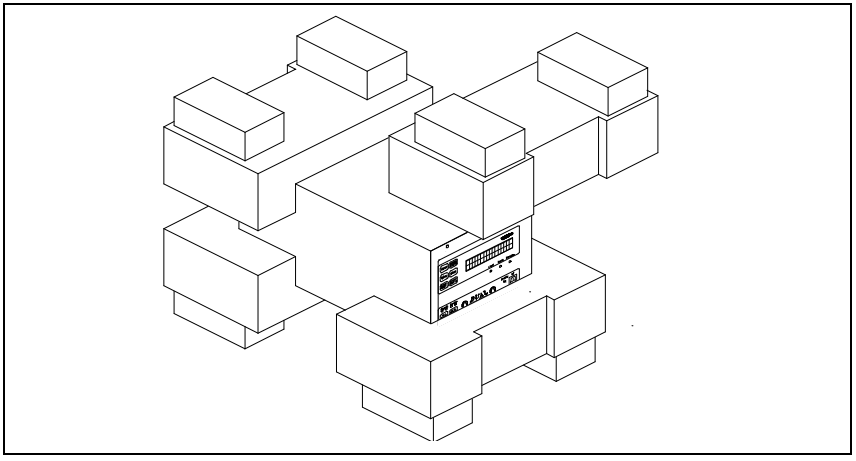


Figure 1 Emballage du contrôleur

Installation

AVERTISSEMENT!

Pour la sécurité de l'opérateur, le contrôleur 4UHV doit être alimenté par un câble d'alimentation à 3 fils doté d'une prise mâle approuvée à un niveau international. Brancher le câble avec prise mâle à une prise femelle raccordée à la terre de façon adéquate afin d'éviter tout risque d'électrocution et de pouvoir remplir les conditions de conformité prescrites par les normes CE. Les hautes tensions qui se développent à l'intérieur du contrôleur peuvent être susceptibles de provoquer des blessures graves voire de causer la mort.

Après l'extinction de l'unité, il reste de l'énergie à l'intérieur du contrôleur pendant quelques instants.

Attendre environ 1 minute pour être sûr que l'énergie résiduelle s'est dissipée.

ATTENTION!

Le contrôleur peut être utilisé soit comme unité de table que comme module installé dans une armoire. De toute façon, il doit être placé de manière à ce que l'air puisse circuler librement à travers les trous d'aération présents dans la couverture.

Lorsque le contrôleur est utilisé comme module armoire il DOIT être installé dans un adaptateur d'une hauteur de quatre unités armoire afin d'éviter qu'il ne tombe à l'intérieur de l'armoire même (voir tableau des pièces détachées). Le panneau frontal du contrôleur n'est pas prévu pour supporter le poids de l'unité. Ne pas installer ou utiliser le contrôleur 4UHV dans des milieux exposés aux agents atmosphériques (pluie, neige, glace). En présence de poussière, de gaz corrosifs ou dans des milieux explosifs ou à fort risque d'inflammabilité.

ATTENTION! Le contrôleur 4UHV appartient à la seconde catégorie d'installation (ou surtension) prévue par la norme EN 61010-1. Il est donc nécessaire de brancher le dispositif à une ligne d'alimentation qui soit adaptée à cette catégorie d'appareils.

Le contrôleur 4UHV dispose de connecteurs pour entrées/sorties et pour la communication en série qui doivent être branchés à des circuits externes de façon à ce qu'aucune des parties sous tension ne soitaccessible. Veiller à ce que le système d'isolation du dispositif branché au contrôleur 4UHV soit adapté, même en cas de pannes individuelles, et ce, tel que prévu par la norme EN 61010-1.

NOTE Si le contrôleur est installé dans une armoire, enlever les quatre pieds de manière à ce qu'il soit placé avec au moins 30 mm d'espace en haut et en bas.

ATTENTION! Dans quelques rares cas de panne, il est possible que le contrôleur dégage de la fumée. Si l'unité est utilisée dans des environnements propres, il est nécessaire de prévoir la mise en place de protections adéquates afin d'éviter que la fumée ne puisse contaminer la pièce.

Pendant le fonctionnement, il est nécessaire de respecter les conditions d'environnement suivantes:

- température: de 0 °C à +40 °C
- humidité relative: 0 – 90 % (non condensante).

Utilisation

Dans ce paragraphe, on indique les principales procédures opérationnelles. Pour tous autres détails et pour les procédures concernant des connexions ou des éléments en option, se reporter au paragraphe "Usage" de l'appendice "Technical Information". Avant d'utiliser le contrôleur, effectuer toutes les connexions électriques et se reporter à la notice de la pompe connectée.

AVERTISSEMENT!

N'allumer les canaux haute tension que s'ils ont été branchés aux pompes ioniques par l'intermédiaire des câbles haute tension prévus à cet effet et dotés de câble Interlock.

L'usage du contrôleur est subordonné à l'usage d'un câble haute tension doté d'Interlock.

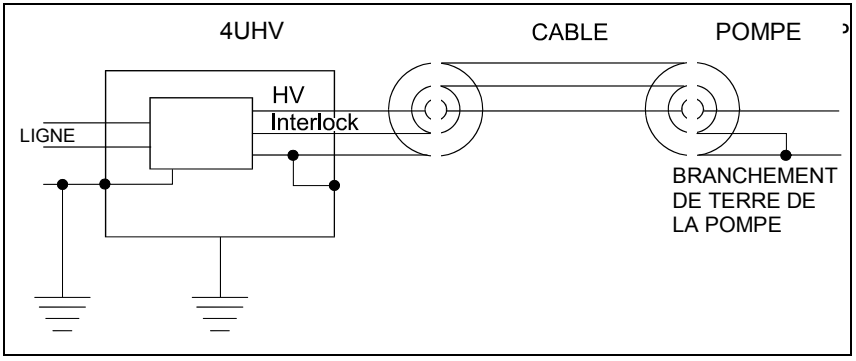


Figure 2 Connexions des masses

NOTE Si l'opérateur veut utiliser un câble HV sans interlock, le sachet d'accessoires contient un kit spécial de câbles pour interlocks préassemblés. L'utilisation de ces accessoires provoque la perte des fonctions de sécurité offertes par l'utilisation de l'interlock.

Consulter la figure ci-dessous pour monter correctement le câble d'interlock contenu dans le sachet d'accessoires en cas de non utilisation du câble de haute tension équipé d'un interlock.

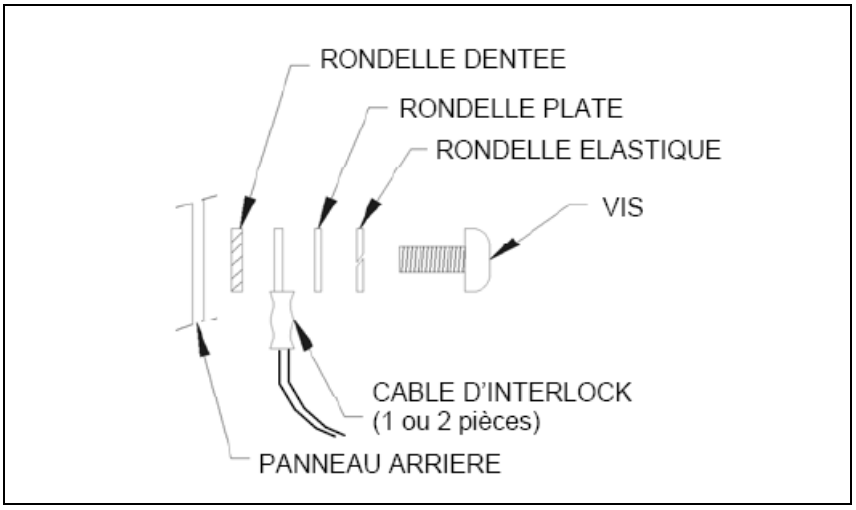


Figure 3

NOTE L'interlock du câble est serré sur la masse de la pompe. Si le branchement est coupé, la haute tension est interrompue.

L'interlock du câble est serré sur la masse de la pompe. Si le branchement est coupé, la haute tension est interrompue.

Pour relier le contrôleur à la pompe, utiliser un câble HV équipé d'un interlock (voir le bordereau de commande des pièces).

Les branchements corrects des masses, du câble HV entre le contrôleur et la pompe, ainsi que du câble d'interlock sont reportés sur la figure "Connexions des masses".

ATTENTION! En cas d'utilisation du câble d'interlock contenu dans le sachet d'accessoires, il faut veiller en particulier à ce qu'aucune pièce ne tombe à l'intérieur du contrôleur.

Allumage du Contrôleur du Panneau Frontal (Modalité LOCAL)

NOTE Pour allumer la haute tension (HV), il faut que l'interlock du câble HV (câble interlock) soit fermé (connecteur branché).

Procéder comme suit pour alimenter le contrôleur et habiliter la tension au niveau des connecteurs de haute tension (H.V.) :

- Eteindre le contrôleur.
- Brancher le câble HV et l'interlock du câble H.V. sur les connecteurs correspondants situés sur le panneau arrière.
- Appuyer brièvement sur la touche "MODE" pour sélectionner la modalité LOCAL jusqu'à ce que l'inscription LOCAL s'affiche sur l'écran.
- Maintenir le bouton HV ON/OFF (2) enfoncé tout en appuyant sur le bouton HV-x (3,4,5,6) ; x correspond au numéro du canal à allumer ou à éteindre.

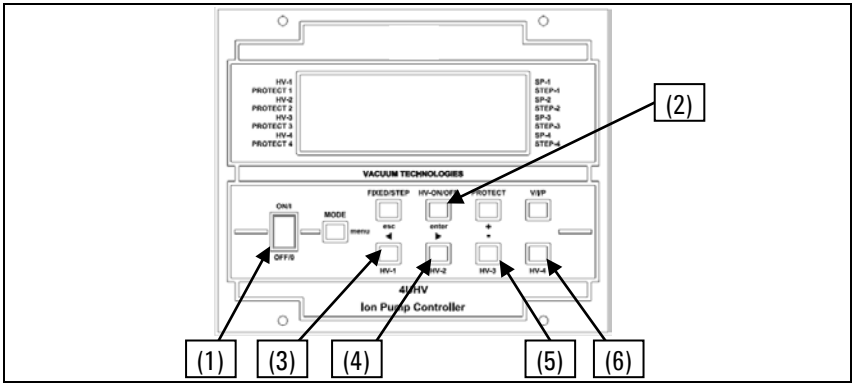


Figure 4 Panneau avant 4UHV sur le contrôleur de pompe

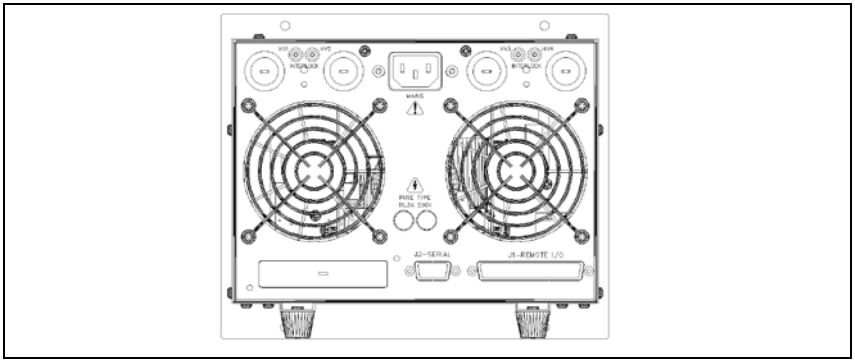


Figure 5 Panneau arrière 4UHV sur le contrôleur de pompe

Pour éteindre les canaux HV :

- Maintenir le bouton HV ON/OFF (2) enfoncé tout en appuyant sur le bouton HV-x (3,4,5,6)) ; x correspond au numéro du canal à allumer ou à éteindre.

Pour plus de renseignements sur l'usage du contrôleur et sur la description des informations de l'écran, consulter la section " Technical Information ".

AVERTISSEMENT!

En cas de situation d'urgence nécessitant un arrêt immédiat de l'unité et de tous les canaux haute tension, désactiver l'interrupteur général (1) situé sur le panneau avant.
En plaçant l'interrupteur général sur OFF, l'unité H.T. s'arrête.

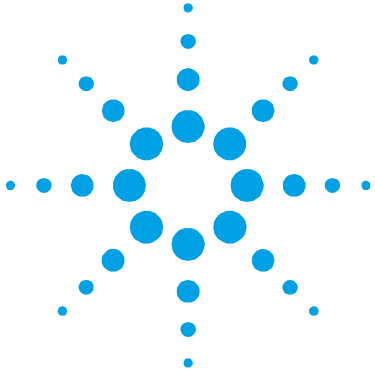
Entretien

Le contrôleur 4UHV n'a besoin d'aucun entretien. N'importe quel entretien sur l'unité doit être effectué par un personnel technique autorisé. En cas de panne contacter le Support technique Agilent ou bien s'abonner au Agilent Advanced Exchange Service" où le contrôleur endommagé est remplacé par un contrôleur reconditionné.

En cas de mise au rebut du contrôleur, procéder à son élimination conformément aux réglementations nationales en la matière.

Mise au Rebut

Signification du logo "WEEE" figurant 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 oeuvre le processus de collecte et mise au rebut.



4 Instructions for Use

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Original Instructions

General Information

This equipment is intended for professional use. Prior to using this equipment the user must carefully read this Instruction Manual in its entirety and any additional information provided by Agilent. Agilent declines all responsibility for damage caused by the total or partial misuse of the instructions provided herein, by the improper use of the equipment by untrained personnel, by unauthorized interventions or by negligence in complying with any specific national rule or regulation.

The following sections provide you with all the information needed to guarantee the operator's safety when using the equipment. Detailed information is provided in the appendix entitled "Technical Information".

The following conventions are used in this manual:

WARNING! **Warning messages call the operator's attention to a specific procedure or operation that could cause serious injury if not performed correctly.**

CAUTION! Caution messages are provided before procedures that could cause damage to the equipment if not complied with.

NOTE Notes provide you with important information extracted from the text.

Storage

The following environmental conditions must be met when transporting and storing the controller:

- Temperature: -20 °C to +70 °C
- Relative humidity: 0 - 95% (non-condensing)

Prior to Installation

The controller comes in a special protective packaging; if there is any sign of damage that could have been caused during transportation, contact your local sales office immediately.

When unpacking the controller, be particularly careful to avoid dropping it or knocking it against anything.

The packaging material is totally recyclable and complies with EEC directives 85/399 for the safeguard of the environment.

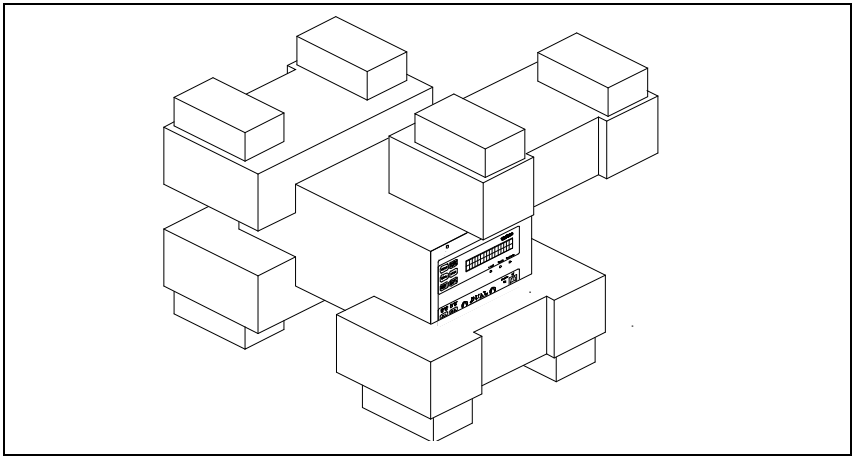


Figure 1 Controller Packaging

Installation

WARNING!

For the safety of the operator, the 4UHV controller must be powered with a 3-wire power cable connected to a plug approved at international level. Use this cable and plug together with an adequately earthed socket so as to prevent electrical shocks and satisfy the requirements of EC norms. The high voltages that develop in the controller can provoke serious injuries or death.

After switching off the unit, residual energy is present inside the controller for some time.

Wait approx. 1 minute to be sure that the residual energy has been dissipated.

CAUTION!

The controller can be used either as a desktop unit or as a rack module. In any case it must be positioned in a way that the air can circulate freely through the ventilation slots on the cover.

If the controller is used as a rack module, it MUST be inserted into a four-rack high adapter to prevent it from falling inside the rack itself (see the table of orderable parts). The 4UHV controller front panel is not designed to support the weight of the unit.

Do not install or use the controller in an environment exposed to atmospheric agents (rain, snow, ice), in the presence of dust, corrosive gases or in a highly flammable or explosive environment.

CAUTION! The 4UHV controller belongs to the second installation category (or overvoltage) as provided for in normative EN 61010-1. Therefore the device must be connected to a power supply line satisfying the requirements for this category.

The 4UHV controller has connectors for inputs/outputs and for serial communications that must be connected to the external circuits in such a way that no powered part is accessible. Make sure that the insulation of the device connected to the 4UHV controller provides an adequate insulation even in the case of a single fault condition as stipulated in the EN 61010-1 normative.

NOTE If the controller is installed in a rack, remove its four feet and place it so as to leave at least 30 mm (1.2 inches) of free space above and below.

CAUTION! In rare circumstances, a controller fault could result in the emission of smoke. If the customer is using the controller in clean environments, they should take adequate measures to avoid the environment being contaminated by any eventual smoke.

The controller must be used in the following environmental conditions:

- Temperature: 0 °C to +40 °C
- Relative humidity: 0 – 90 % (non-condensing).

Usage

This section provides you with the major operating procedures. For more information and for the procedures that concern connections or specific options, refer to the section “USAGE” in the “Technical Information” appendix. Before using the controller, perform all electrical connections and refer to the manual of the connected pump.

WARNING!

Switch on the high voltage channels only if they are connected to the ionic pumps by means of the special purpose high voltage cables equipped with interlock cable.

It is assumed that the controller will be used together with the high voltage cable having a safety interlock.

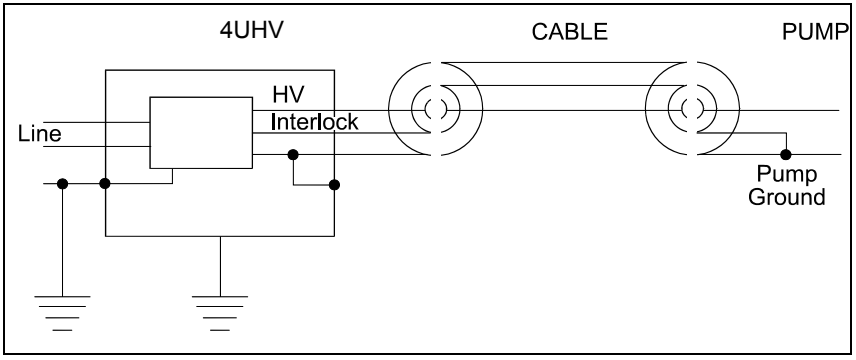


Figure 2 Ground Connections

WARNING!

If an HV cable without interlock is to be used, the accessories bag contains a specific kit of preassembled interlock leads. However, with this type of use, the safety capability furnished using the interlock is lost.

Refer to the figure below for correct assembly of the interlock cable furnished in the accessories bag in the case in which an HV cable with interlock is not used.

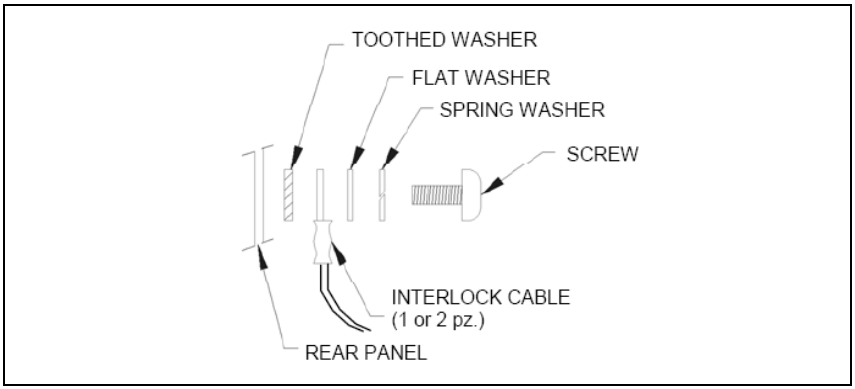


Figure 3

NOTE The cable interlock closes on pump ground. The high voltage is disabled if the connection is interrupted.

The cable interlock closes on pump ground. The high voltage is disabled if the connection is interrupted. To connect the controller to the pump, use a HV cable with interlock (see parts that can be ordered).

Correct connection of masses, of the HV cable between the controller and pump and of the interlock cable is illustrated in the “Connections” figure.

CAUTION! When using the interlock cable furnished in the accessories bag, make sure that no parts drop accidentally inside the controller.

Powering On the Controller from the Front Panel (LOCAL Mode)

NOTE To switch on the High Voltage (HV), the interlock of the HV cable (cable interlock) must be closed (connector inserted).

Proceed as follows to power the controller and apply voltage to the high voltage (HV) connectors:

- Switch off the controller.
- Connect the HV cable and the interlock of the HV cable in the related connectors on the rear panel.
- Select LOCAL mode, briefly pressing the “MODE” key until LOCAL is shown on the display.
- Hold down the HV ON/OFF button (2) while pressing the HV-x (3,4,5,6) button where x is the number of the channel to be switched on/off.

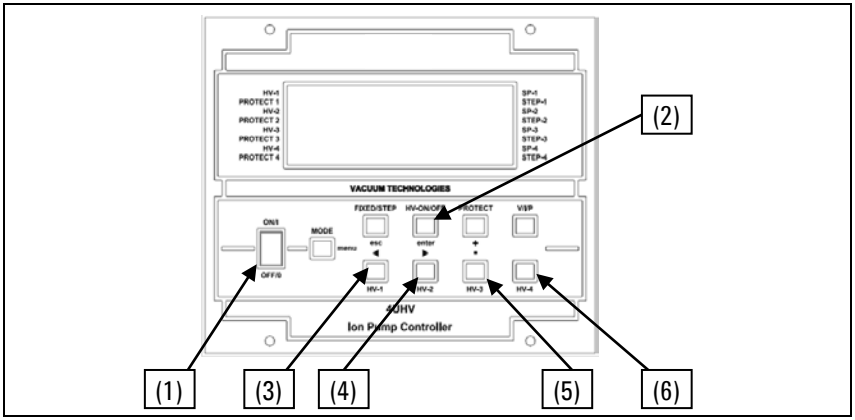


Figure 4 Front Panel 4UHV Ion Pump Controller

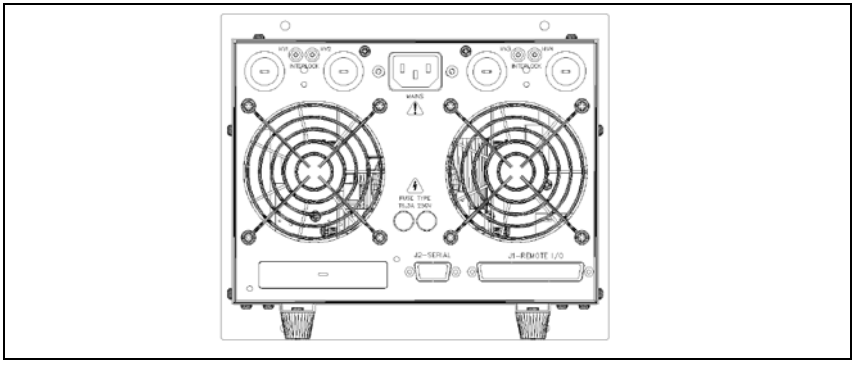


Figure 5 Rear Panel 4UHV Ion Pump Controller

To switch off the HV channels:

- Hold down the HV ON/OFF (2) button while pressing the HV-x (3,4,5,6) button where x is the number of the channel to be switched on/off.

For further details on using the controller and for a description of the information appearing on the display, refer to the section “Technical Information”.

WARNING! **In situations of emergency, to switch off the unit and all the high voltage channels, turn off the main power switch (1) situated on the front panel.**

When the main switch is turned off, the HV unit is switched off.

Maintenance

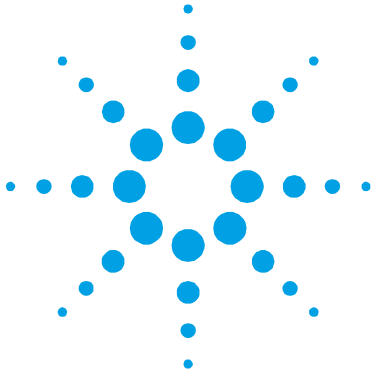
The 4UHV controller does not require any maintenance. Any form of servicing on the unit must be performed by authorized personnel.

If servicing is needed, contact Agilent Technical Support or subscribe to the “Agilent Advanced Exchange Service” where the faulty controller is replaced by a refurbished one.

If the controller needs to be scraped, proceed to do so in compliance with the specific national norms.

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.



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4UHV Controller Description

The 4UHV controller is a power supply for ion pumps. It supplies a high voltage on output, selectable as 3 kV, 5 kV or 7 kV, and measures the output current.

The controller has the following features:

- Front panel with keypad and a 4-row display (4x20, 146 x 62 mm) for displaying the operating values (voltage, current, pressure)
- Remote I/O card with DB37 connector
- RS232 and RS485 serial communications.

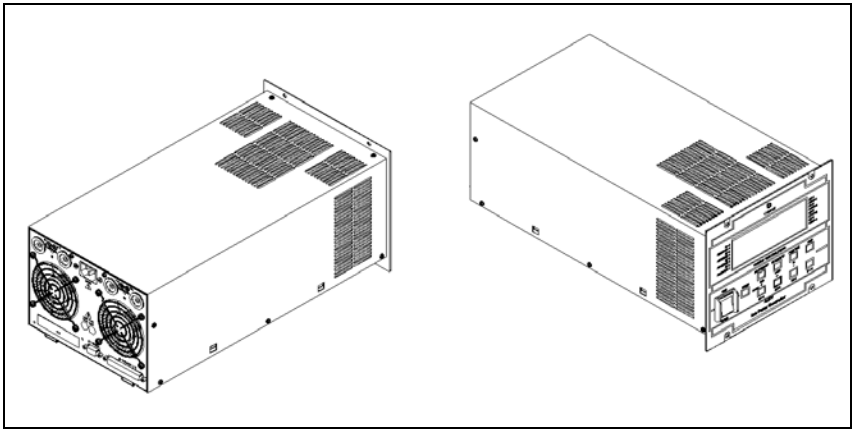


Figure 6 4 UHV Controllers

The controller contains one or two high voltage modules.

Each high voltage module can have one 200 W channel or one 120 W channel or two 80 W channels.

Some examples of how HV channels can be configured are given below (for details see the Orderable Parts table):

- Four independent channels with a maximum of 80 W power per channel

- Two independent channels with a maximum of 200 W power per channel
- One 200 W channel and two 80 W channels.
- One 120 W channel

The 4UHV controller can be operated in the modes: LOCAL, SERIAL or REMOTE.

Specifications

Tab. 1 Specifications

Component	Description
Input Voltage	100 - 240 Vac (+/-10 %)
Input Frequency	50/60 Hz
Input Power	600 VA
Output HV Voltage	+/- 7000 Vdc +/- 5 %
Output HV Short circuit current	40 mA (for 80 W channels) 100 mA (for 200 W channels)
Output HV Power max	200 W or 80 W each channel
Operating temperature	0 °C to 40 °C
Storage temperature	-20 °C to +70 °C
Fuse	5x20 T6.3A 250 V
Voltage measurement	Resolution 100 V Accuracy: +/- 5 %
Current measurement	Measurement range: 10 nA to 100 mA, logarithmic scale Resolution : 2 digit of the mantissa (maximum 10 nA) Accuracy: +/- 6 %
Weight	6.5 kg
Compliance with:	EN 61010-1 2001: Safety requirements for electrical equipment for measurement control and laboratory use. EN 61326-1 2006: Electrical equipment for measurement control and laboratory use EMC requirements

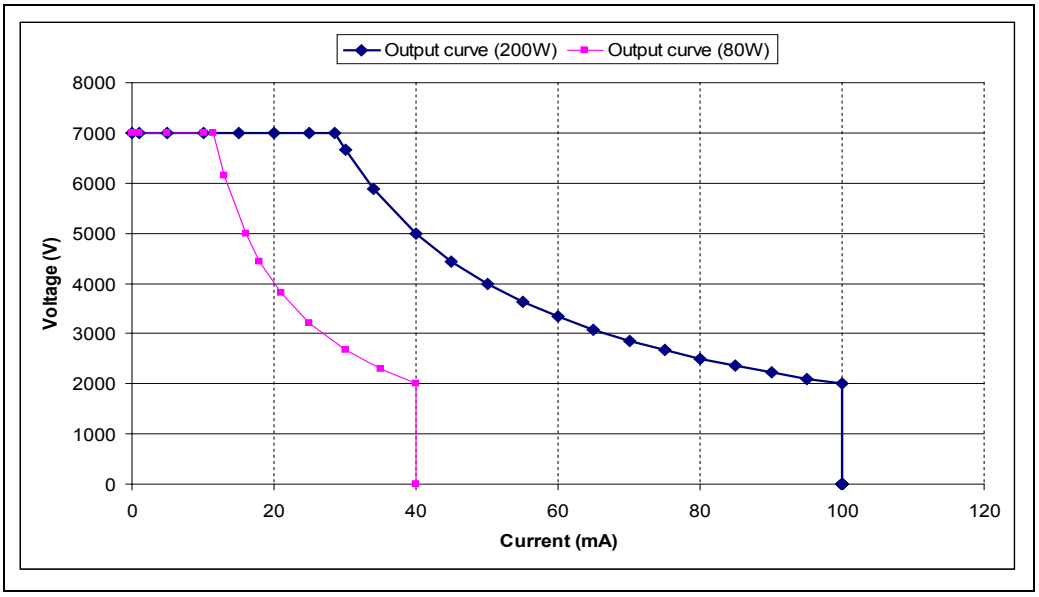


Figure 7 Output voltage vs Output current

Controller Outline

The outline dimensions for the 4 UHV controller are shown in the following figures:

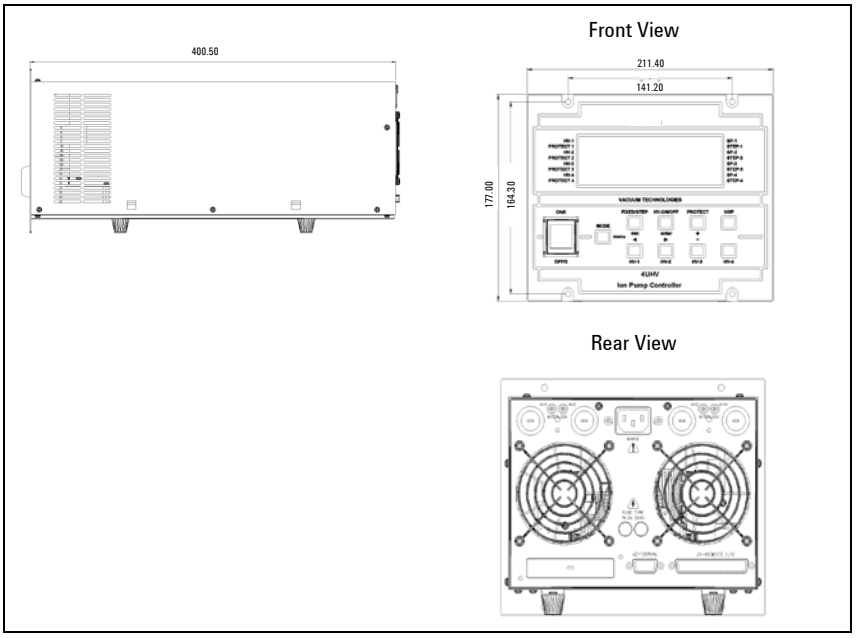


Figure 8 Controller Model Dimensions

Front Panel Description

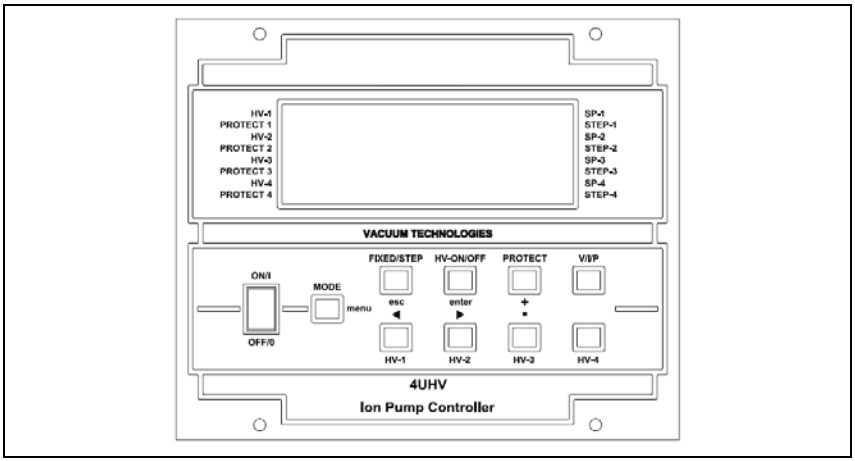


Figure 9 Front Panel

Keys

Tab. 2 Keys

Main Power	This is the main switch for switching on and off the controller.
HV-ON/OFF	To switch a high voltage channel on or off, keep the HV-ON/OFF key pressed while you press the HV-x key, where x is the number of the channel you want to switch on or off.
Fixed/Step	To change the output voltage choosing between: 7 kV, 5 kV, 3 kV, Step-Mode and Fixed-Mode, keep the Fixed/Step key pressed while you press the HV-x key, where x is the number of the channel for which you want to change the output voltage. The output voltage will change cyclically between “STEP, 7 kV, 5 kV, 3 kV”.
Protect	To activate or disactivate Protect mode, keep the Protect key pressed while you press the HV-x key, where x is the number of channel for which you want to activate or disactivate the “Protect” functionality.
Mode	By pressing this key briefly (< 2 sec), the ”operating mode” changes cyclically between: Serial, Front, Remote. You exit from this display automatically after 5 seconds. By keeping this key pressed for a long time (> 2 sec), you enter the menu. To exit from the menu, press the Mode key again for a long time.

Graphic Signals

Four black squares are present for each channel indicating, respectively, the 4 states of the channel. The meaning of the 4 indicators is the following:

- 1. HV-x
  - Solid mark = HV on
  - Without mark = HV off
  - Blinking mark = Error
- 2. Protect-x
  - Solid mark = Protect on
  - Without mark = Protect off
  - Blinking mark = Protect error
- 3. SP-x
  - Solid mark = Set-point activate
  - Without mark = Set-point not active
- 4. Step-x
  - Solid mark = Step
  - Without mark = Fixed

Rear Panel Description

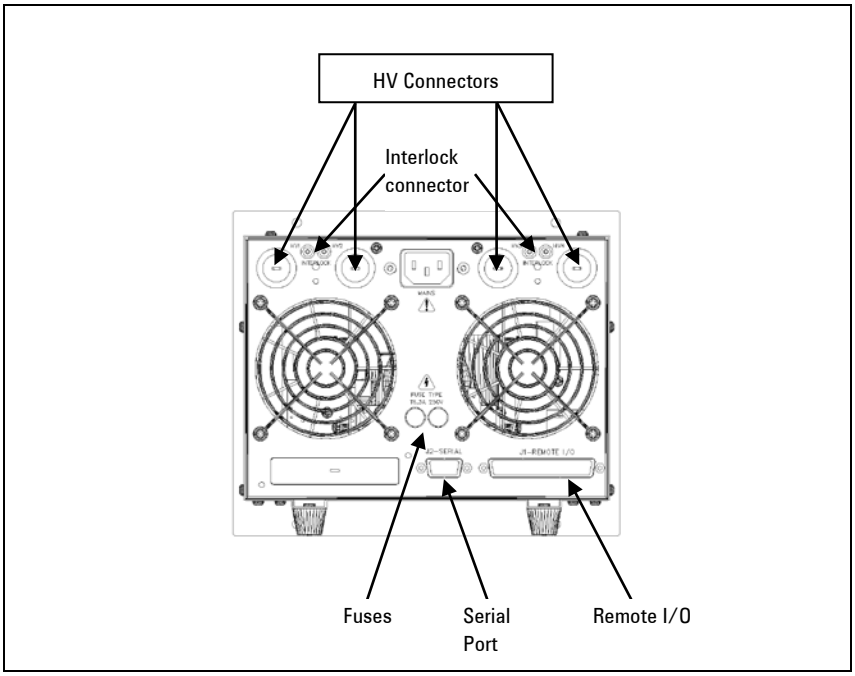


Figure 10 Rear Panel

The following are present on the rear panel:

- The HV connectors (1, 2, 3 or 4 according to model)
- The interlock connectors associated to each channel
- The fuses
- The DB9 connector for RS232 and RS485 serial communication
- The DB37 connector for Remote I/O signals.

Fuse Holder

The following figure shows the location of this assembly.

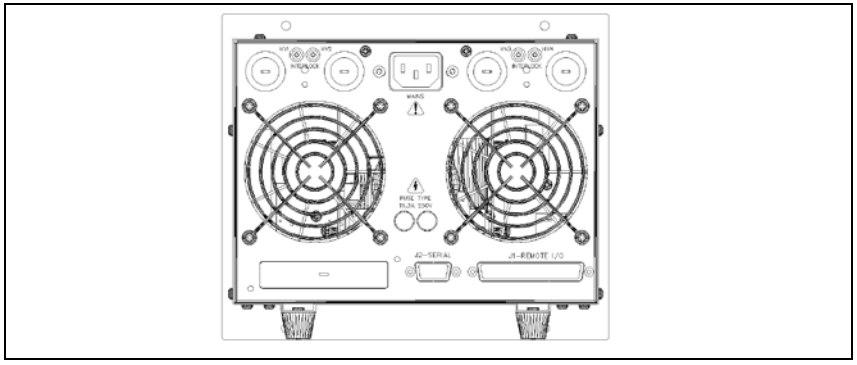


Figure 11 Rear Panel

Proceed as follows to replace one or both fuses:

1. Disconnect the mains cable
2. Waiting for 15 second
3. Remove the fuse with a small screwdriver
4. Replace the fuse
5. Use only 5x20 T6.3 A 250 V fuses

Interlock connection

In order to guarantee a proper working of the interlock connection, the user must take care that the total resistance between the ground controller and the input of the interlock cable (connected to the ion pump) is less than 400 Ohm.

Operating Mode

The controller 4UHV for ion pumps can be operated in three different modes:

- Local
- Serial
- Remote.

The commands sent to the controller (for example, HVON/OFF, Target voltage etc) can only be given in the mode chosen, while the data (for example, current, pressure, voltage etc...) can be read in all the modes.

E.g.: If you select Local mode, the HV channels can only be switched on via the keys on the Front Panel, but the current supplied can be read via the Front Panel, Serial and Remote.

Change from one mode to the next can be done either via the Front Panel or a serial command.

NOTE Change from one mode to another can be done with the high voltage switched on. However, the channels switch off if Remote mode is selected but no commands for switching on are present on the remote connector.

Selecting “Operating Mode” from Front Panel

To display the current mode, press the Mode key briefly (less than 2 seconds).

To change mode, press the Mode key again. The three modes will be displayed in a cyclic fashion: Local, Serial, Remote.

After selecting the required mode, wait approximately 5 seconds to return to the previous screen.

Selecting “Operating Mode” via Serial

Using serial communications via the protocol “WIN protocol” (see chapter: SERIAL – Window Protocol), write the chosen value in window 8:

Tab. 3 Keys

Value	Description
0	Serial
1	Remote
2	Local

Start-Up

This chapter explains how to switch on and off the unit and the high voltage channels. In the following chapters, all the functions of the controller are explained in detail.

1. Put the main power switch situated on the front panel to OFF
2. Insert the power cable into the correct connector on the rear panel
3. Connect the HV cables to the controller and to the ion pumps
4. Make sure that “Interlock” of HV cable is connected
5. To switch on the unit, put the main power switch to ON
6. Select Local for the Operating mode
7. Press the keys HV-ON/OFF keys and HV-x, where x is the number of the channel you want to switch on.

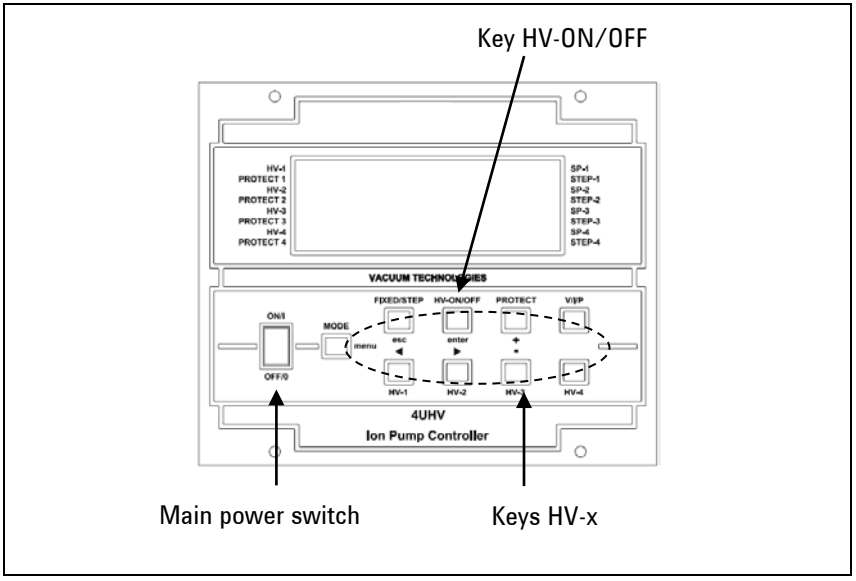


Figure 12 Front Panel

Functions

Step-mode / Fixed mode

The high voltage provided to an ion pump can change from 3kV up to 7kV.

The user can set the Fixed mode with the voltage of 3kV or 5kV or 7kV using the front panel or through the serial commands or through the remote I/O.

In order to optimize the pumping speed of the ion pump and to minimize the influence of the leakage current, the controller implements the Step-mode function.

With this function the controller provides 7kV for about 5 seconds, then it changes the voltage among 3 – 5 – 7 kV depending on the current drawn by the ion pump and on the ion pump type.

Tab. 4

Pump Type	Current for switching from 7kV to 5kV	Current for switching from 5kV to 3kV
500 diode	1.4E-3 A	3.9E-5 A
300 diode	7.2E-4 A	2.1E-5 A
150 diode	3.6E-4 A	9.5E-6 A
75-55-40 diode	2.2E-4 A	6.7E-6 A
20 diode	2.0E-4 A	2.7E-6 A
10 diode	2.0E-5 A	6.0E-6 A
500 StarCell	9.0E-4 A	2.5E-5 A
300 StarCell	5.5E-4 A	1.6E-5 A
150 StarCell	3.0E-4 A	8.5E-6 A
75-55-40 StarCell	1.3E-4 A	3.8E-6 A
20 StarCell	6.5E-5 A	1.9E-6 A

Protect

The protect function is useful to avoid damages in the ion pump due to the overcurrent.

If this function is enabled, the controller waits 120 seconds from the HV ON, then it begins to check the current provided. If the current exceeds the threshold in the following table, the HV channel turns off and the controller gives the “Protect Error”.

This kind of error is not a controller error but it is only a warning, informing that the HV channel is turned off because the protect current threshold was exceeded.

Tab. 5

Pump type	Protect current
500 diode	100mA
300 diode	100mA
150 diode	50mA
75-55-40 diode	30mA
20 diode	20mA
10 diode	5mA
500 StarCell	100mA
300 StarCell	100mA
150 StarCell	50mA
75-55-40 StarCell	30mA
20 StarCell	20mA

Set-point

The controller has 4 relays (relay A, relay B, relay C, relay D) and they can be configured as set-points.

Set-point configuration

You can configure the four relays to operate with any channels.

Example 1 (default configuration): one relay for each channel.

Relay A → channel 1; Relay B → channel 2; Relay C → channel 3; Relay D → channel 4.

Example 2: two relays for one channel.

Relay A → channel 1; Relay B → channel 1 ; Relay C → channel 3; Relay D → channel 3.

Example 3: all relays for only one channel (e.g. channel 2).

Relay A → channel 2; Relay B → channel 2; Relay C → channel 2; Relay D → channel 2.

All these configurations can be set by front panel menu.

Description

The microprocessor begins to drive the relays about 10 seconds after reaching the target voltage (this behaviour is in order to avoid wrong activations due to voltage ramping).

The threshold of the set-point has a hysteresis of 5%.

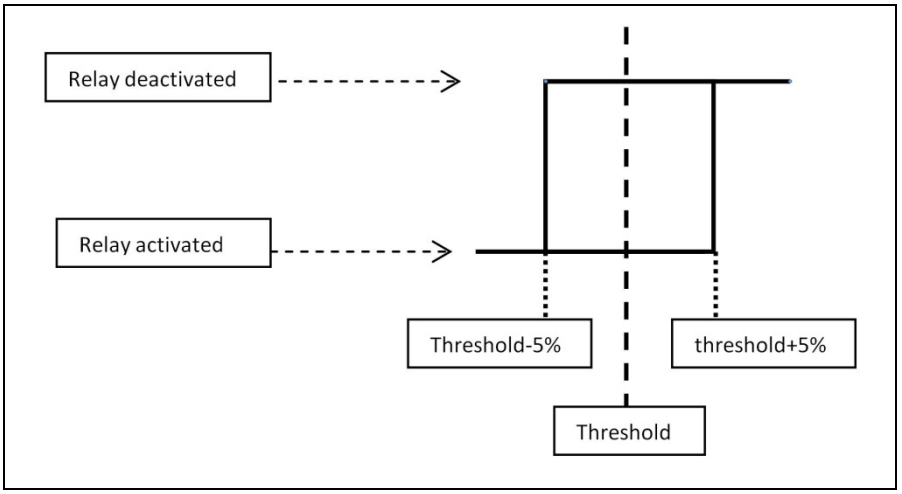


Figure 13

Autostart

This function allows to restore the high voltage output when the main power supply is restored after a fail.

When the Autostart is selected:

- If the HV channel is in ON status and the main power supply fails, when the supply is restored the HV channel automatically turns on.

- If the HV channel is in OFF status and the main power supply fails, when the supply is restored the HV channel stays in OFF.

If the Autostart is not selected:

- The HV channel returns always OFF after that the main power fails.

Fan configuration

If you select “Always ON” in the menu configuration (configure – general – fan) , the two cooling fan in the rear panel are always switched ON.

If you select “Threshold” the two cooling fan are switched OFF if the output current of each HV channel is below of the 1mA.

Reset standard settings

If “yes” is selected, the settings are restored to the standard unit configuration.

Tab. 6

Component	Description
Remote I/O Signal Listing	
Pin 4	+24 V +/- 10 %, max. current 60 mA
Pin 5	Reserved
Fault	A unique fault relay for all channels and for all errors.
Pin 12	NC Fault Relay
Pin 13	NO Fault Relay
Pin 31	Common Fault Relay
Channel 1	
Input	
Pin 6	CH1 on/off
Pin 7	CH1 protect
Pin 8	CH1 step
Pin 22	Digital Gnd
Analog Output	
Pin 1	Analog 1
Pin 3	Analog Gnd
Digital Output	
Pin 17	CH1 NC Set-point Relay
Pin 18	CH1 (Common) Relay
Pin 19	CH1 NO Set-point Relay
Channel 2	
Input	
Pin 9	CH2 on/off
Pin 10	CH2 protect
Pin 11	CH2 step
Pin 22	Digital Gnd
Analog Output	
Pin 2	Analog 2

Component	Description
Pin 3	Analog Gnd
Digital Output	
Pin 14	CH2 NC Set-point Relay
Pin 15	CH2 (Common) Relay
Pin 16	CH2 NO Set-point Relay
Channel 3	
Input	
Pin 23	CH3 on/off
Pin 24	CH3 protect
Pin 25	CH3 step
Pin 22	Digital Gnd
Analog Output	
Pin 20	Analog 3
Pin 3	Analog Gnd
Digital Output	
Pin 35	CH3 NC Set-point Relay
Pin 36	CH3 (Common) Relay
Pin 37	CH3 NO Set-point Relay
Channel 4	
Input	
Pin 26	CH4 on/off
Pin 27	CH4 protect
Pin 28	CH4 step
Pin 22	Digital Gnd
Analog Output	
Pin 21	Analog 4
Pin 3	Analog Gnd
Digital Output	
Pin 32	CH4 NC Set-point Relay
Pin 33	CH4 (Common) Relay
Pin 34	CH4 NO Set-point Relay

Tab. 7 Input/ Output Electrical Specification

I/O Ratings				
I/O Type	**ON**	**OFF**	**Max Load**	**Note**
Input Digital	V < 12V I > 2.25mA	24V > V > 23V I < 100uA		
Analog Output			1mA	Range 0-10V
Output Relay				24V , 1A max
+24V dc				24V +/- 10% - 60mA max

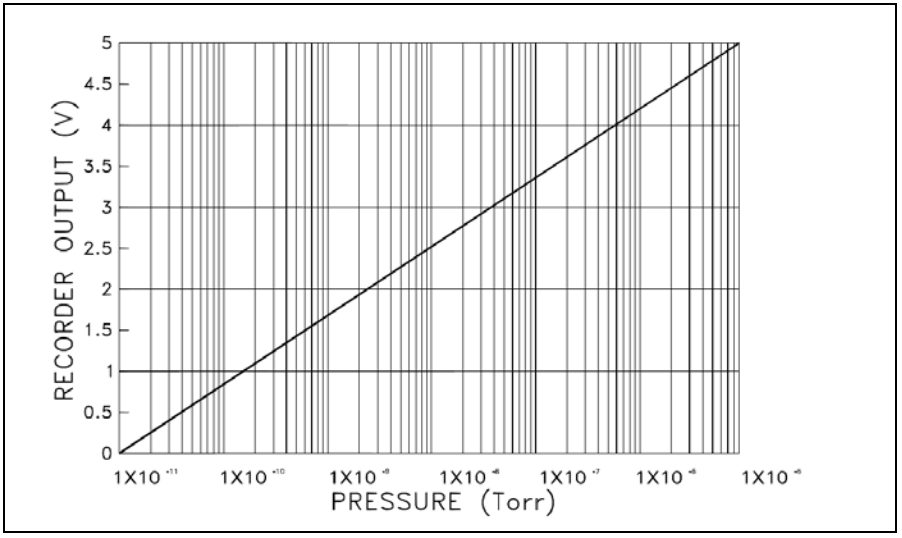


Figure 14 Recorder Output Pressure

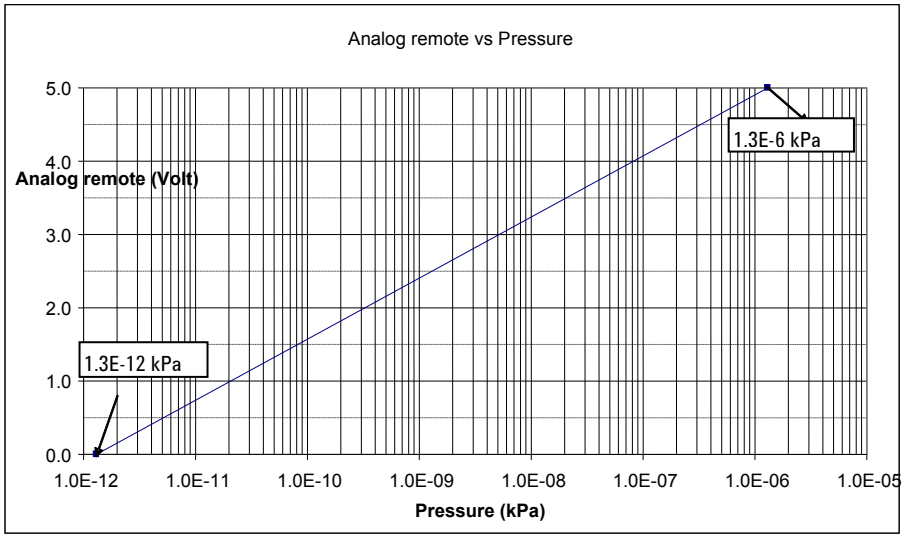


Figure 15 Analog remote vs Pressure (kPa)

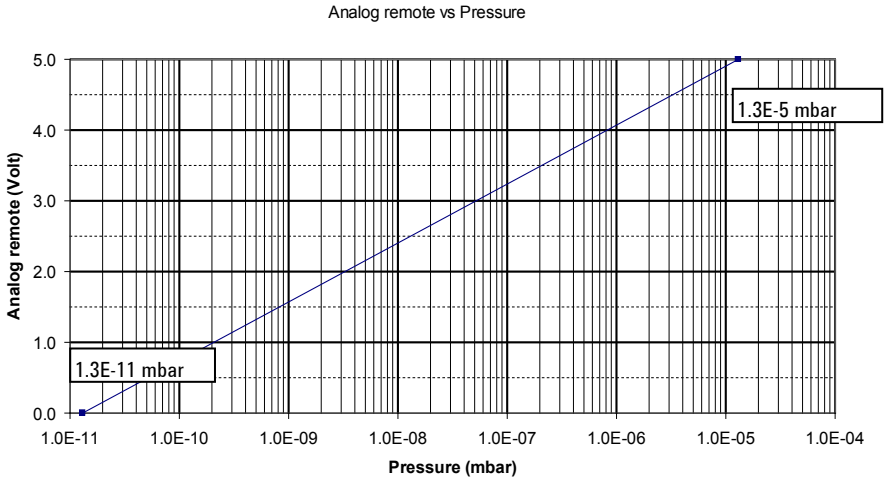


Figure 16 Analog remote vs Pressure (mbar)

Connection of Input Remote

In order to activate the inputs remote (CH on/off, Ch protect, CH Step) connect the pins as following:

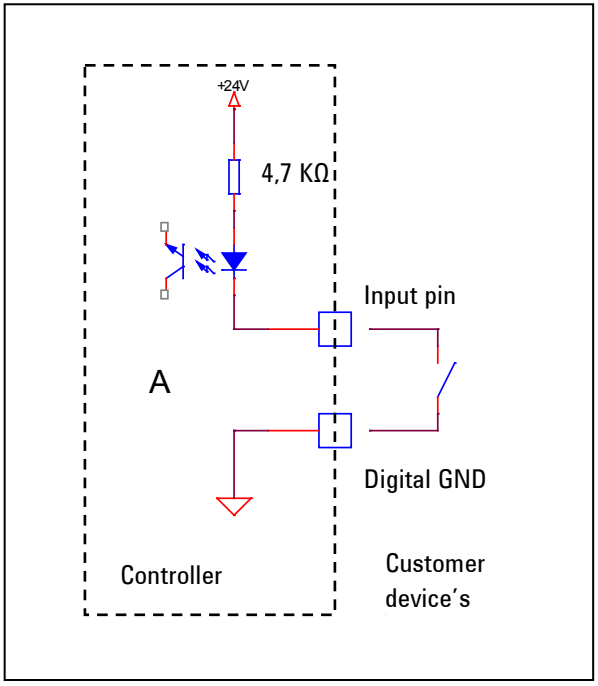


Figure 17 Input

Serial

The following figure shows the 4UHV interconnections.

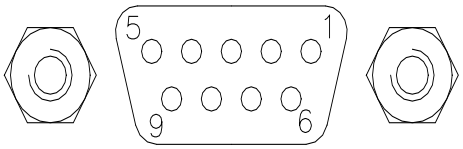


Figure 18 4UHV interconnections

This is a 9-pin D-type serial input/output connector that allows the 4UHV to be controlled via an RS232 or RS485 connection.

Tab. 8

PIN No.	Signal Name
1	+5 V (OUT)
2	TX (RS232)
3	RX (RS232)
4	Reserved
5	GND
6	A + (RS485)
7	Reserved
8	B - (RS485)
9	Reserved

Connector Examples

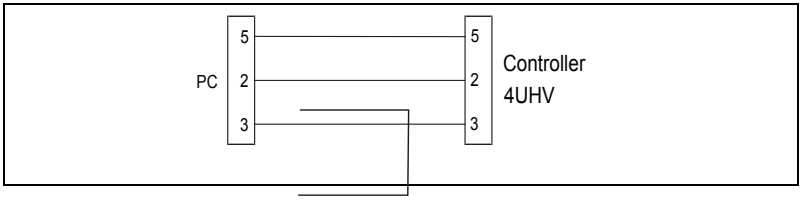


Figure 19 RS–232 Connection

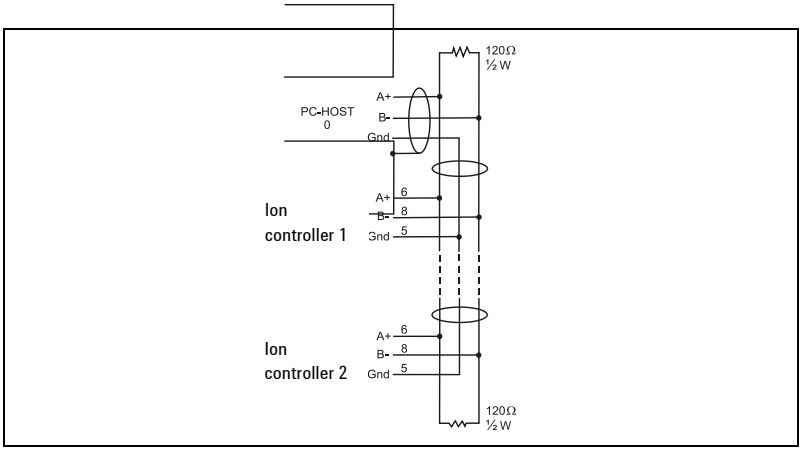


Figure 20 RS–485 Connection

Window Protocol

Both RS232 and the RS485 interfaces are available on the 9-pin D-type serial input/output connector. The communications protocol is the same (see the structure below), but only the RS485 handles the address field. Therefore, to enable the RS485, you need to select both the type of communication and the device address using the front panel menu or the Navigator software.

The Window Protocol is the same of the Turbo Pump, but the meaning of the Window is different (see the below chapter: Windows Description).

Communications Format

- 8 data bit
- No parity
- 1 stop bit
- Baud rate: 9600

Communications Protocol

The communications protocol is of MASTER/ SLAVE type, where:

- Host = MASTER
- Controller = SLAVE

The communication takes place as follows:

1. The host (MASTER) sends a MESSAGE + CRC to the controller (SLAVE)
2. The controller answers with an ANSWER + CRC to the host.
3. The MESSAGE is a string in the following format:
4. <STX>+<ADDR>+<WIN>+<COM>+<DATA>+<ETX>+<CRC>

NOTE When data is indicated between two quotes ('...'), it implies that the data indicated is the corresponding ASCII character.

Where:

- <STX> (Start of transmission) = 0x02
- <ADDR> (Unit address) = when you select the RS232 communication, this field is not handled and the controller always answers with its address stored in EEPROM
  <ADDR> (Unit address) = 0x80 + device number (0 to 31) (for RS485)

- <WIN> (Window) = a string of 3 numerics indicating the window number (from '000' to '999'); for the meaning of each window, see the relevant paragraph.
- <COM> (Command) = 0x30 to read the window, 0x31 to write in the window
- <DATA> = an alphanumeric ASCII string with the data to be written in the window. In the case of a read command, this field is not present. The field length varies according to the data type, as shown in the following table:

Tab. 9

Data Type	Field Length	Valid Characters
Logic (L)	1	'0' = OFF '1' = ON
Numeric (N)	6	'-', '.', '0' . . . '9' right justified with '0'
Alphanumeric (A)	10	From blank to '_' (ASCII)

- <ETX> (End of transmission) = 0x03
- <CRC> = XOR of all characters following <STX> and including the <ETX> terminator. The value is hexadecimal coded and represented by two ASCII characters.

The SLAVE addressed responds with an ANSWER whose structure depends on the MESSAGE type.

When the MESSAGE is a read command, the SLAVE responds transmitting a string with the same structure as the MESSAGE.

NOTE Using the RS485 interface, the message structure is identical to that used for the RS232 interface, the only difference being the value assigned to the ADDRESS <ADDR>.

The controller can reply with the following types of response:

Tab. 10

Type	Length	Value	Description
Logic		-	After a read instruction of a logic window.
Numeric	6 bytes	-	After a read instruction of a numeric window.
Alphanumeric	10 bytes	-	After a read instruction of a alphanumeric window.
ACK	1 byte	(0x6)	Execution of the command has been successful.
NACK	1 byte	(0x15)	Execution of the command has failed.
Unknown Window	1 byte	(0x32)	The window specified in the command is not a valid window.
Data Type Error	1 byte	(0x33)	The data type specified in the command (Logic, Numeric or Alphanumeric) is not in agreement with the Window specified.
Out of Range			The value expressed during a write command is not within the range value for the specified window.
Win Disabled	1 byte	(0x35)	The window specified is Read Only or is temporarily disabled.

Tab. 11 Windows Description

WIN	R/W	Type	Description	Range
11	R/W	L	HV ON/OFF CH1	0 = OFF(def) ; 1=ON
12	R/W	L	HV ON/OFF CH2	0 = OFF(def) ; 1=ON
13	R/W	L	HV ON/OFF CH3	0 = OFF(def) ; 1=ON
14	R/W	L	HV ON/OFF CH4	0 = OFF(def) ; 1=ON
108	R/W	N	Baud rate	(1-4) [1200-2400-4800-9600]
205	R	N	Status	
206	R	N	Error code	
319	R/W		Controller Model	
323	R/W		Controller Serial number	
503	R/W	N	RS485 Serial Address	[0-31]; 1=def
504	R/W	L	Serial Type Select	0= RS232(def) ;

WIN	R/W	Type	Description	Range
				1= RS485
505	R/W	N	Channel Selection	(see below)
600	R/W	N	Unit pressure	0 = Torr ; 1=mBar (def) ; 2=Pa
602	R/W	A	Protect	(see below)
603	R/W	A	Fixed/Step	(see below)
610	R/W	N	Device Number CH1	(see below)
612	R/W	N	Power max CH1	20 W – 80 W
613	R/W	N	V target CH1	[3000,7000] V step 1000; def=7000
614	R/W	N	I protect CH1	[1,100] step 1 mA
615	R/W	A	Set Point CH1	[X.XE-XX]
620	R/W	N	Device Number CH1	(see below)
622	R/W	N	Power max CH2	20 W – 80 W
623	R/W	N	V target CH2	[3000,7000] V step 1000; def=7000
624	R/W	N	I protect CH2	[1,100] step 1 mA
625	R/W	A	Set Point CH2	[X.XE-XX]
630	R/W	N	Device Number CH3	(see below)
632	R/W	N	Power max CH3	20 W – 80 W
633	R/W	N	V target CH3	[3000,7000] V step 1000; def=7000
634	R/W	N	I protect CH3	[1,100] step 1 mA
635	R/W	A	Set Point CH3	[X.XE-XX]
640	R/W	N	Device Number CH4	(see below)
642	R/W	N	Power max CH4	20 W – 80 W
643	R/W	N	V target CH4	[3000,7000] V step 1000; def=7000

WIN	R/W	Type	Description	Range
644	R/W	N	I protect CH4	[1,100] step 1 mA
645	R/W	A	Set Point CH4	[X.XE-XX]
800	R	N	Temperature FAN	[0, 200] °C
801	R	N	Temperature HV1	[0, 200] °C
802	R	N	Temperature HV2	[0, 200] °C
803	R	A	Interlock Status	(see below)
804	R	A	Status Set Point	(see below)
808	R	N	Temperature HV3	[0, 200] °C
809	R	N	Temperature HV4	[0, 200] °C
810	R	N	V measured CH1	[0, 7000] V ; step 100 V
811	R	A	I measured CH1	[1E-10, 9E-1] A
812	R	A	Pressure CH1	[X.XE-XX]
820	R	N	V measured CH2	[0, 10000] V ; step 100 V
821	R	A	I measured CH2	[1E-10, 9E-1] A
822	R	A	Pressure CH2	[X.XE-XX]
830	R	N	V measured CH3	[0, 10000] V ; step 100 V
831	R	A	I measured CH3	[1E-10, 9E-1] A
832	R	A	Pressure CH3	[X.XE-XX]
840	R	N	V measured CH4	[0, 10000] V ; step 100 V
841	R	A	I measured CH4	[1E-10, 9E-1] A
842	R	A	Pressure CH4	[X.XE-XX]

Example:

Turn ON Channel 1

PC → Controller

02	80	30	31	31	31	31	03	42	33
STX	ADDR	WINDOW			WR	DATA	ETX	CRC	

Controller → PC

02	80	06	03	38	33
STX	ADDR	ACK	ETX	CRC	

Turn OFF Channel 1

PC → Controller

02	80	30	31	31	31	30	03	42	32
STX	ADDR	WINDOW			WR	DATA	ETX	CRC	

Controller → PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Read Pressure (win 812) Channel 1

PC → Controller

02	80	38	31	32	30	03	38	38
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	38	31	32	30	20	20	20	31	2E	35	45	2D	30	38	03	45	32
STX	ADDR	WINDOW			WR	DATA										ETX	CRC	

Data=1.5E-8

Read Voltage (win 810) Channel 1

PC → Controller

02	80	38	31	30	30	03	38	41
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	38	31	32	30	30	30	33	30	30	30	03	38	39
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

Data=3000

Read Current (win 811) Channel 1

PC → Controller

02	80	38	31	31	30	03	38	42
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	38	31	31	30	20	20	20	32	2E	39	45	2D	30	35	03	45	33
STX	ADDR	WINDOW			WR	DATA										ETX	CRC	

Data=2.9E-5

Operating mode (Win 601)

Autostart ON

PC → Controller

02	80	36	30	31	30	30	30	30	30	30	30	30	30	30	31	03	38	34
STX	ADDR	WINDOW			WR	DATA										ETX	CRC	

Controller → PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Autostart OFF

PC → Controller

02	80	36	30	31	31	30	30	30	30	30	30	30	30	30	30	03	38	35
STX	ADDR	WINDOW			WR	DATA										ETX	CRC	

Controller → PC

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Protect (Win 602)

PC → Controller

02	80	36	30	32	30	03	38	37
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	36	30	32	30	30	30	30	30	30	30	30	31	30	30	03	38	36
STX	ADDR	WINDOW			WR	DATA										ETX	CRC	

Fixed/Step (603)

PC → Controller

02	80	36	30	33	30	03	38	36
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	36	30	33	30	30	30	30	30	30	30	30	30	31	03	38	37
STX	ADDR	WINDOW			WR	DATA									ETX	CRC	

Status Set Point (804)

PC → Controller

02	80	38	30	34	30	03	38	46
STX	ADDR	WINDOW			RD	ETX	CRC	

Controller → PC

02	80	38	30	34	30	30	30	30	30	30	30	30	30	31	03	38	45
STX	ADDR	WINDOW			WR	DATA									ETX	CRC	

Error Description

Controller errors can be displayed in two windows:

- WIN 505 where the user writes the channel whose error is to be viewed
- WIN 206 where the controller shows the error code of the channel written in window 505.

If the value 0 is written in window 505, the errors of all the channels remain displayed in window 206.

Tab. 12

WIN 505 value	Channel
0	All channels
1	Channel 1
2	Channel 2
3	Channel 3
4	Channel 4

Error Code

The error code is displayed in decimal format. Binary representation of this number provides indications regarding the type of error that has occurred.

The error table is shown below:

Tab. 13

Error code in decimal format	Binary	Description
0	0000000000000	No error
1	0000000000001	FAN error
2	0000000000010	Power input error from HV
4	0000000000100	Power input error from PFC
8	0000000001000	Overtemp PFC
16	0000000010000	Error communication CPU-HV

Error code in decimal format	Binary	Description
32	0000000100000	Interlock cable
64	0000001000000	Overtemp HV
128	0000010000000	Protect
256	0000100000000	Measurement error
512	0001000000000	HV out error
1024	0010000000000	Short circuit
2048	0100000000000	HV disabled

Example:

Interlock cable

Error code: 32 (decimal) → 0000000010000 (binary) →Interlock cable error

Interlock cable + Overtemp HV

Error code: 96 (decimal) → 0000000110000 (binary) →Interlock cable error + Overtemp HV

Error code (Win 206)

Error interlock

02	80	32	30	36	30	03	38	37
STX	ADDR	WINDOW			RD	ETX	CRC	

02	80	32	30	36	30	30	30	30	30	33	32	03	38	36
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

Channel selection (Win 505)

Read

02	80	35	30	35	30	03	38	33
STX	ADDR	WINDOW			RD	ETX	CRC	

02	80	35	30	35	30	30	30	30	30	30	30	03	38	33
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

Write 1

02	80	35	30	35	31	30	30	30	30	30	31	03	38	33
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Error code (Win 206)

Interlock error:

02	80	32	30	36	30	03	38	37
STX	ADDR	WINDOW			RD	ETX	CRC	

02	80	32	30	36	30	30	30	30	30	33	32	03	38	36
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

Channel selection (Win 505)

Write 2

02	80	35	30	35	31	30	30	30	30	30	32	03	38	30
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

02	80	06	03	38	35
STX	ADDR	ACK	ETX	CRC	

Error code (Win 206)

Interlock not present error because channel 2 has been selected:

02	80	32	30	36	30	03	38	37
STX	ADDR	WINDOW			RD	ETX	CRC	

02	80	32	30	36	30	30	30	30	30	30	30	03	38	37
STX	ADDR	WINDOW			WR	DATA						ETX	CRC	

Old Serial Protocol ("Binary Protocol")

The "Binary Protocol" serial protocol used by some old controllers is no longer supported.

For new projects, Agilent advises that the new protocol "Window protocol" be used. Nevertheless, for compatibility with the old systems, some commands of the "Binary Dual" have been implemented.

The 4UHV controller cannot implement all the commands of the Dual but only a subset.

Communications Format

These protocols have the following formats:

Tab. 14

Type	No. of Bytes	Description
Read	1	"?" (3Fh[3]) performs reads on the Splitter Box
Status	1	"0" (30h) = false = off, "1" (31h) = true = on [5]
Integer	5	"xxxxx" represented in BCD[4] with 5 digits (always positive)
BitField	8	Like integer type, but meanings are associated with the single bits of the number.
Exponential	7	"x.xEsxx" where x is BCD digits, E is the 45h character and s is the ("+" or "-" sign).
String	n	Sequence of n characters included within the 20h and 7Fh range

[3] The "h" notation following a number indicates that the number is expressed in hexadecimal format.

[4] BCD: The number is represented by digits included within the "0" and "9" range (ASCII 30h - 39h).

[5] Status can also assume values greater than "1".

The commands have a read and a write mode. By specifying the type of read operation being performed, the Host queries the Splitter Box that, in turn, replies in a format that is compliant with the command sent. As long as a write operation can be carried out, the write and read formats for the same command coincide.

Host to Dual controller command format:

[header command] [length] [command] [channel] [data] [checksum]

Dual controller to Host reply format:

[header response] [length] [command] [channel] [data] [checksum]

Tab. 15

Field	No. of Bytes	Value	Description
Header command	1	81h	Header for the RS232 and RS422 serial.
		81h÷A0h	Header and address for the RS485 (129 – 160) serial.
Header response		01h	Header for the serial RS232, RS422.
		01h÷20h	Header and address for the RS485 serial.
Length	2		Data packet length in BCD (command, channel, data fields only).
Command			See description of commands (byte 0 command, byte 1 subcommand).
Channel	1	30h	No channel
		31h	High Voltage 1
		32h	High Voltage 2
		33h	High Voltage 3
		34h	High Voltage 4
Data	N		See description of commands
Checksum	1		XOR of all bytes (checksum excluded) in and with 7Fh.

Command Listing

It is not possible to implement all the “Binary Dual” protocol commands on the 4UHV controller. The commands that are implemented on the 4UHV controller are the following:

Tab. 16

No.	Description	ASCII	Hex
1	Local/remote	Z0	5Ah 30h
3	HV-ON/OFF	A0	41h 30h
4	Device number	F0	46h 30h
5	Measurement unit	D0	44h 30h
7	Protect	C0	43h 30h
8	Fixed/Step	B0	42h 30h
9	Power supply polarity	G0	47h 30h
10	Max. power	J0	4Ah 30h
11	Vmax	H0	48h 30h
12	Iprotect	K0	4Bh 30h
13	Set point	P0	50h 30h
14	V meas.	S0	53h 30h
15	I meas.	T0	54h 30h
16	P meas.	U0	55h 30h
17	Set-point status	g0	67h 30h
18	Interlock status	]0	5Dh 30h
19	Error status	z0	7Ah 30h

Tab. 17 Interlock Status Coding

Bit Field	Interlock Coding (active if 1)
01h	HV3 Cable Interlock
02h	Reserved
04h	Reserved
08h	HV1 Cable Interlock
10h	HV4 Cable Interlock
20h	Reserved
40h	Reserved
80h	HV2 Cable Interlock

Tab. 18

Value	Error Status Coding (active if 1)
33h	Cable Interlock
36h	Excess temperature
37h	Power input error
38h	FAN Error
39h	Protect
31h 30h	Short-circuit
31h 31h	HV out error
31h 32h	Zero Measurement

Display and Menus

Switching on the unit, the initial screen that appears is as follows:

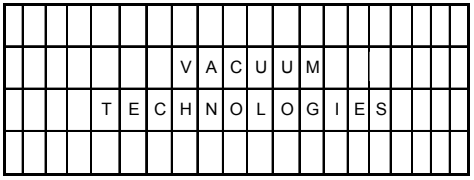


Figure 21

Afterwards a screen of the following type appears, which displays for each channel the name of the ion pump selected.

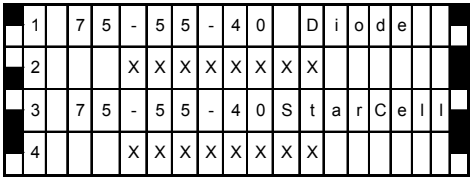


Figure 22

Displaying Channel-Related Information

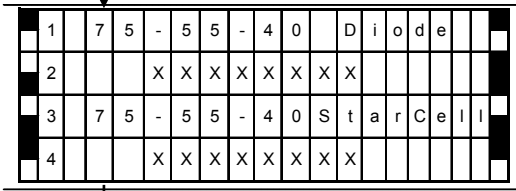
The display can be configured easily to display different information, depending on the needs of the customer.

Information on All Channels

The voltage on all the four channels can be displayed simultaneously, or the current of all four channels, or the pressure.

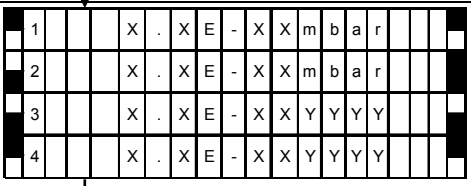
To do this, press the “V/I/P” key; the following screens appear cyclically.

Tab. 19



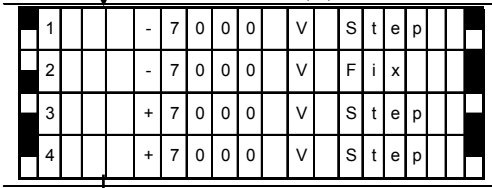
5 Display the pump type for each channel

6 Press “V/I/P”



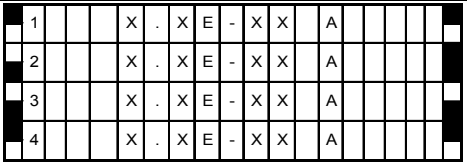
7 Display the pressure for each channel

8 Press “V/I/P”



9 Display the voltage and operation mode “Step Mode” – “Fixed mode” for each channel

10 Press “V/I/P”



11 Display the current for each channel

12 Press “V/I/P”

Information on a Single Channel

You can display all the information (voltage, current, pressure and pump type) for each single pump. To do this, press the HV-x key, where x corresponds to the channel to display:

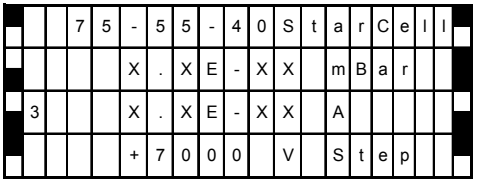


Figure 23

In this case, the pump type, pressure, current and voltage of channel 3 are being displayed.

Commands

You can give the controller three types of commands:

- Switch on/off channels
- Activate/disactivate Protect mode
- Change output voltage

Switching Channels On/Off

To switch a high voltage channel on or off, keep the HV-ON/OFF key pressed while you press the HV-x key, where x is the number of the channel you want to switch on or switch off.

Activating /Disactivating Protect Mode

To activate or disactivate Protect mode, keep the Protect key pressed while you press the HV-x key, where x is the number of channel for which you want to activate or disactivate the “Protect” functionality.

Changing the Output Voltage

To change the output voltage choosing between 7KV, 5KV, 3KV, Step-Mode and Fixed-Mode, keep the Fixed Step key pressed while you press the HV-x key, where x is the number of the channel for which you want to change the output voltage.

The output voltage changes cyclically between “STEP 7 KV, 5 KV, 3 KV”.

Menu

Keeping the “Mode” key pressed for a long time (> 2 sec), you enter the Menu. In the Menu, you can configure some parameters of the controller. These configurable parameters can be divided into two groups:

- Controller general parameters
- Specific parameters for each channel.

The general parameters of the controller are the following:

- Pressure measurement unit: mbar, torr, pascal
- Serial baud rate: 1200, 4800, 9600, 19200, 38400
- Serial Type: RS232, RS485
- RS485 Address: from 0 to 31
- Auto start: Yes, No
- Fan: Always on, switches on if the current descends below 1mA
- Set Point: The set-point can be associated with the channels and a value set
- Analog output: Analog output is associated with the channels.
- Reset to standard settings

The specific parameters for each channel are the following:

- Pump: Select the type of pump
- I Protect: Set the Protect current
- Power max: Set the maximum power.

Scrolling Through the Menus

The 4UHV controller menu has a three-level structure.

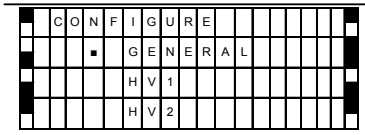
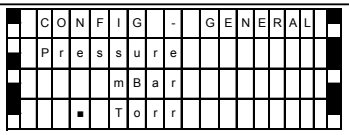
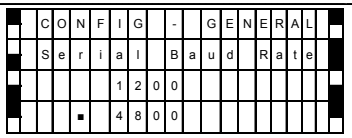
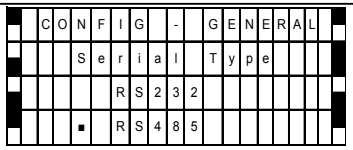
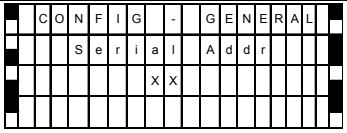
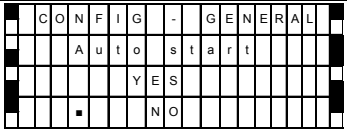
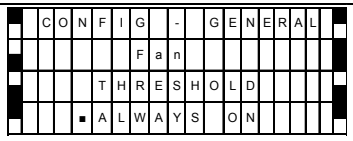
- To scroll through the menus, remaining on the same level, press the keys " ◄ " " ►".
- To go to submenu, press "Enter" in the transition menus.
- To escape to go back, press "Esc" at any time.
- In multiple-choice menus, the symbol " ■ " appears next to the value currently in use and the value currently used will flash.
- To change the value in each menu, press the key + or -. This causes the symbol " ■ "to move, but the old value continues to flash.
- To save the new value, you must press "Enter". As you press "Enter", the new value is saved and starts to flash.

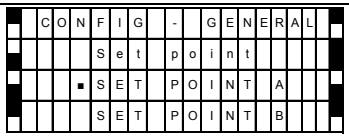
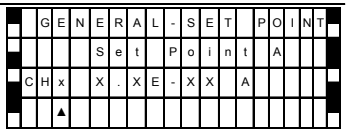
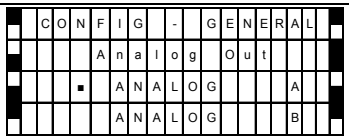
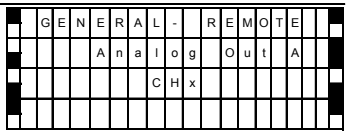
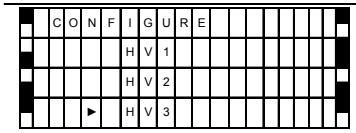
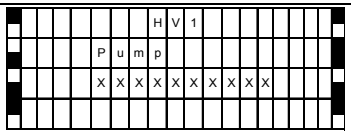
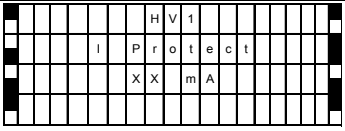
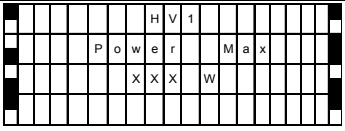
If it is not possible for all the choices to be displayed simultaneously, the values will scroll across (the titles of the menus remain fixed).

Menu Screens

Examples of all the screens that appear in the Menu are provided below.

Tab. 20 Menu Screens

First Level	Second Level	Third Level
		
		
		
		
		
		

First Level	Second Level	Third Level
		
		
		
		
		

PROFIBUS

Connectors Pin-Out

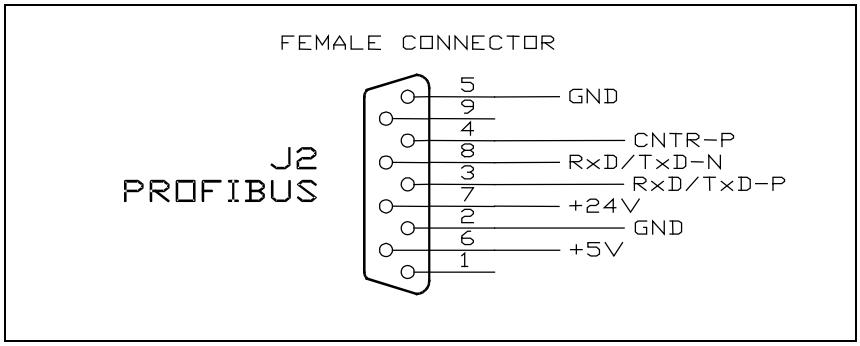


Figure 24 4UHV Profibus Connectors pin-out

Rotary Switches

The interface has two switches.

The switches are used to set the ProfiBus address of the device. Up to 126 different addresses (from 0 to 125) can be selected.

The address value sets by the 2 switches is expressed in hexadecimal notation, so value from 00 to 7D are permitted; this setting is read by the interface during the power-on phase, so any change of the switch position after the power-on is ignored.

Indicators

Two LEDs are present on the interface: one green and one red.

The red led indicates that the interface is correctly powered.

The green led shows the interface status according the following table:

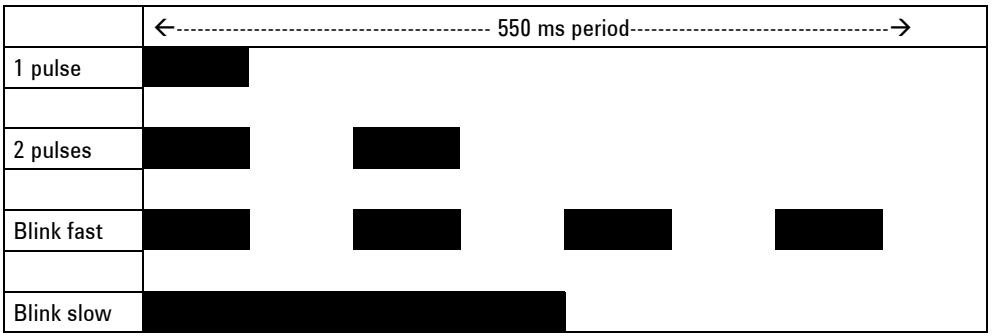


Figure 25

1 pulse

ProfiBus link established, controller link NOT established yet (Controller state machine not in Regular data exchange). This situation could be normal in the first seconds after the interface power on (Controller address searching phase) or after the controller power-on.

2 pulses

ProfiBus link not established yet (ProfiBus state machine not in Regular data exchange). This failure has priority (in the indication) over the previous.

Blink fast

Gateway fail (internal check) or wrong address set (address > 0x7D or address not stable during power-on).

Blink slow

Gateway operating properly.

GSD File

The GSD file provided with this interface is:

AGIL0D32.gsd

The ID number is:

0D32 hex

State Machine

From the software point of view, the interface can be seen as two devices (one for ProfiBus and the other for RS-485) linked together. Each device has its own state machine to manage the device operation.

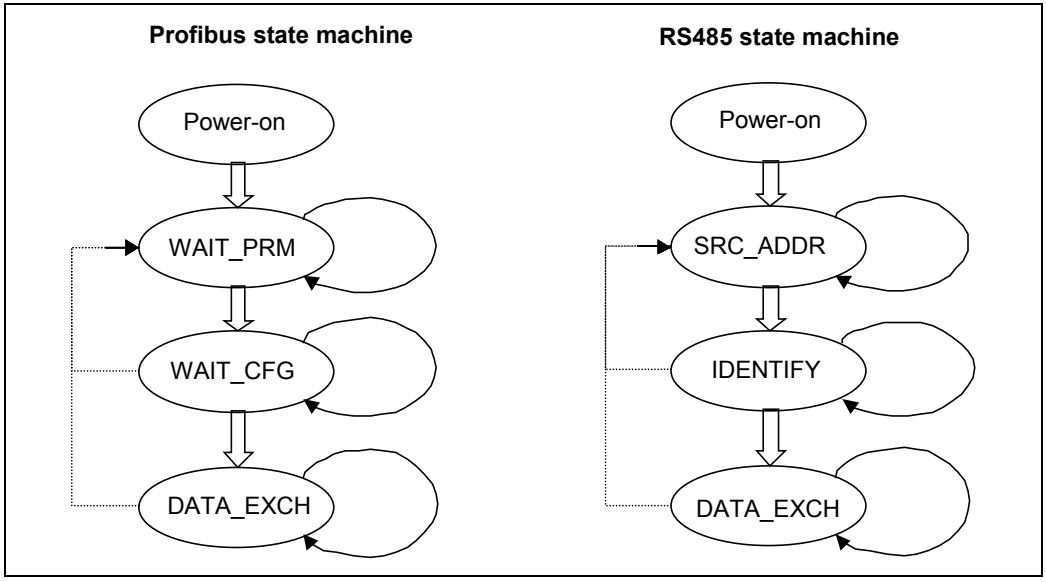


Figure 26

Tab. 21

PROFIBUS STATE MACHINE		RS485 STATE MACHINE	
Status	**Meaning**	**Status**	**Meaning**
POWER_ON	Interface set-up	POWER_ON	Interface set-up
WAIT_PRM	Wait for parameterisation from the master	SRC_ADDR	Search for the controller serial address
WAIT_CFG	Wait for configuration from the master	IDENTIFY	Identify controller model and protocol
DATA_EXCH	Regular data exchange	DATA_EXCH	Regular data exchange

The two machines continuously share I/O data with the relative bus, and interact each other only in following conditions:

- ProfiBus Data exchange is suspended (static diagnosis activated) if the RS-485 serial link in not established
- RS-485 Data exchange is suspended (only for output data) if the ProfiBus State machine is not in Data Exchange mode

As a general rule, unrecoverable communication errors make each machine to jump to the state immediately following the power-on state (WAIT_PRM or SRC_ADDR).

Message Mapping

The communication is based on the continuous data exchange capability of the ProfiBus standard, where the master sends continuously the entire slave configuration and reads back the entire slave status.

For this purpose one Input (from slave to master) and one Output (from master to slave) buffers are provided. All the needed parameters are mapped inside each buffer. The following tables reassume the ProfiBus parameter access, related to the corresponding windows serial protocol.

NOTE The profibus communication and the serial communication use the same link inside of the controller, then you can not use at the same time the profibus communication and the serial communication.

Configuration Buffer Structure

Total buffer length: 15 bytes (4 words + 7 byte)

Tab. 22

Offset (byte)	Unit/Res.	Range	Size (byte)	Description
0	-		1	$B_{7,6}$ → Pressure unit (0= Torr, 1= mbar, 2 = Pa) B_5 → Auto power ON (0= NO, 1= Yes)
1	1bit = 1mA	1mA to 100mA	1	Ch1 Protect current value
2	1bit = 1mA	1mA to 100mA	1	Ch2 Protect current value
3	1bit = 1mA	1mA to 100mA	1	Ch3 Protect current value
4	1bit = 1mA	1mA to 100mA	1	Ch4 Protect current value
5	Pressure unit selected	1 to 99 for mantissa -9 to -1 for exponent	2	Set Point A value The first byte is the mantissa, the second byte is the exponent
7	Pressure unit selected	1 to 99 for mantissa -9 to -1 for exponent (*see Note 1*)	2	Set Point B value The first byte is the mantissa, the second byte is the exponent
9	Pressure unit selected	1 to 99 for mantissa -9 to -1 for exponent (*see Note 1*)	2	Set Point C value The first byte is the mantissa, the second byte is the exponent
11	Pressure unit selected	1 to 99 for mantissa -9 to -1 for exponent (*see Note 1*)	2	Set Point D value The first byte is the mantissa, the second byte is the exponent
12	-	(*see Note 2*)	1	$B_{7,4}$ → Set point A mapping (default = 1) $B_{5,0}$ → Set point B mapping (default = 1)
13	-	(*see Note 2*)	1	$B_{7,4}$ → Set point C mapping (default = 1) $B_{5,0}$ → Set point D mapping (default = 1)

Note 1: Each set point value is divided into 2 bytes: one for mantissa (the value is divided by 10) and one for exponent.
Example1: if you want to set the Set-Point A to 3.5E-5 you have to write: byte offset 4 = 35d (23hex) and byte offset 5 = 5d (FBhex)
Example2: if you want to set the Set-Point A to 1.0E-9 you have to write: byte offset 4 = 10d (0Ahex) and byte offset -5 = -5d (F7hex)

Note 2: This byte is divided in two nibble (4 bits), each nibble is the number of HV channel to associated to the set point X
Example:
if you want assign the set point A to channel 2 you have to write byte offset 12 $B_{7,4}$ = 0010
if you want assign the set point B to channel 3 you have to write byte offset 12 $B_{5,0}$ = 0011
if you want assign the set point C to channel 4 you have to write byte offset 13 $B_{7,4}$ = 0100
if you want assign the set point D to channel 1 you have to write byte offset 13 $B_{5,0}$ = 0001

Configuration Output Structure

Total buffer length: 2 bytes

Tab. 23

Offset (byte)	Unit/Res.	Size (byte)	Description
0	-	1	B_7 → HV 1 On/Off B_6 → HV 2 On/Off B_5 → HV 3 On/Off B_4 → HV 4 On/Off B_3 → HV1 protect mode On/Off B_2 → HV2 protect mode On/Off B_1 → HV3 protect mode On/Off B_0 → HV4 protect mode On/Off
1	.	1	B_7 → HV 1 mode (0= Fixed, 1= Step) B_6 → HV 2 mode (0= Fixed, 1= Step) B_5 → HV 3 mode (0= Fixed, 1= Step) B_4 → HV 4 mode (0= Fixed, 1= Step) $B_{1,0}$ → 1=remote, 2 = local, 3= Profibus [1]

NOTE [1] It is not possible to switch between profibus mode and serial mode using the profibus communication you can switch between these two modes only in Local mode.

Configuration Input Structure

Total buffer length: 40 bytes (9 bytes + 8 floating)

Tab. 24

Offset (byte)	Unit/Res.	Size (byte)	Description
0			B_7 → Communication stetus between CPU and internal profibus card B_6 → Communication status (0= ok, 1= not good) $B_{1,0}$ → 1=remote, 2=local, 3=Profibus
1	-	1	B_7 → HV 1 On/Off B_6 → HV 2 On/Off B_5 → HV 3 On/Off B_4 → HV 4 On/Off B_3 → HV1 protect mode On/Off B_2 → HV2 protect mode On/Off B_1 → HV3 protect mode On/Off B_0 → HV4 protect mode On/Off
2	.	1	B_7 → HV 1 mode (0= Fixed, 1= Step) B_6 → HV 2 mode (0= Fixed, 1= Step) B_5 → HV 3 mode (0= Fixed, 1= Step) B_4 → HV 4 mode (0= Fixed, 1= Step) B_3 → Set point A (0= not active, 1 = active) B_2 → Set point B (0= not active, 1 = active) B_1 → Set point C (0= not active, 1 = active) B_0 → Set point D (0= not active, 1 = active)
3	-	1	B_7 → HV 1 cable interlock B_6 → HV 2 cable interlock B_5 → HV 3 cable interlock B_4 → HV 4 cable interlock B_3 → HV 1 Remote on/off B_2 → HV 1 Remote on/off B_1 → HV 1 Remote on/off B_0 → HV 1 Remote on/off
4	1 bit = 100V	1	Controller status (0= no error, 6 = error)
5	1 bit = 100V	1	Channel 1 , High voltage measured
6	1 bit = 100V	1	Channel 2 , High voltage measured
7	1 bit = 100V	1	Channel 3 , High voltage measured
8	1 bit = 100V	1	Channel 4 , High voltage measured
9	Ampere	4 (floating point)	Channel 1 , Current measured
13	Ampere	4 (floating point)	Channel 2 , Current measured
17	Ampere	4 (floating point)	Channel 3 , Current measured
21	Ampere	4 (floating point)	Channel 4 , Current measured
25	Pressure unit selected	4 (floating point)	Channel 1 , Pressure measured
29	Pressure unit selected	4 (floating point)	Channel 2 , Pressure measured
33	Pressure unit selected	4 (floating point)	Channel 3 , Pressure measured
37	Pressure unit selected	4 (floating point)	Channel 4 , Pressure measured

Diagnosis Management

In addition to the Profibus six byte standard diagnostic, the interface provides both user diagnostic and static diagnostics functions.

Standard diagnostic

The standard diagnostic management is fully compliant with the Profibus specification.

User diagnostic

The first byte in the user diagnostic area reflects the controller serial link status with following meaning:

Bit 0: controller doesn't respond

Bit 2: first loop of requests not ended (values in the input data are not fully coherent yet)

So, if the low nibble in the first byte is equal to 0, the interface is working properly. Otherwise there is a problem.

During the start-up phase after one interface power on or controller power on, the first byte can assume values different from zero for few seconds.

Each nibble (4 bits) in the bytes following the interface status byte, represents the status of the last attempt to write a parameter with following coding **(diag status byte)**:

1. Write success
2. Protocol error (checksum error on low speed network)
3. Invalid channel
4. Invalid data
5. Invalid channel
6. Range error
7. Format error
8. Write not allowed while HV ON
9. Write not allowed while HV OFF
10. Write allowed only in serial mode

The Profibus external diagnosis services are used to report following unexpected situations:

Controller Fails

If the controller switches to fail mode, an external diagnostic service is required and one byte in the diagnostic buffer signals the type of failure.

User Parameter Mismatch

If the user sets one or more parameters out of their allowed range, a Profibus external diagnostic service is required and some bits in the diagnosis frame signals which parameter is wrong (i.e. over range or under range).

Diagnostic Buffer (15 byte)

Tab. 25

Offset	Meaning		
0	B_0	station non exist (set by master)	Standard diagnostics
	B_1	station not ready (slave not ready for data exchange)	
	B_2	cfg fault (configuration data doesn't match)	
	B_3	ext diag (slave has external diagnostic data)	
	B_4	not supported (slave doesn't support requested function)	
	B_5	invalid slave response (slave sets permanent '0')	
	B_6	prm fault (wrong parameter assignment)	
	B_7	master_lock (slave is parameterised by another master)	
1	B_0	prm req (slave has to be re-parameterised)	
	B_1	stat diag (static diagnosis)	
	B_2	fixed '1'	
	B_3	wd_on (response monitoring active)	
	B_4	Freeze mode (received freeze command)	
	B_5	Synch mode (received synch command)	
	B_6	reserved	
	B_7	diag deactivated (slave is parameterised by another master)	
2	Reserved		
3	Master Add (master address after parameterisation. FF= without parameter)		
4	Ident number high		
5	Ident number low		
6	External diagnosis "Header" length indication including header		

Offset	Meaning		
7	Interface Status		External diagnostic
	B_0	Controller not responds	
	B_1	Not used	
	B_2	Input data not fully coherent yet	
	B_3	Not used	
	$B_{1...7}$	Not used	
8	$B_{7...4}$	HV1 On/Off diagnostic status	
	$B_{3...0}$	HV2 On/Off diagnostic status	
9	$B_{7...4}$	HV3 On/Off diagnostic status	
	$B_{3...0}$	HV4 On/Off diagnostic status	
10	$B_{7...4}$	HV1 Protect Mode diagnostic status	
	$B_{3...0}$	HV2 Protect Mode diagnostic status	
11	$B_{7...4}$	HV3 Protect Mode diagnostic status	
	$B_{3...0}$	HV4 Protect Mode diagnostic status	
12	$B_{7...4}$	HV1 Fixed/Step Mode diagnostic status	
	$B_{3...0}$	HV2 Fixed/Step Mode diagnostic status	
13	$B_{7...4}$	HV3 Fixed/Step Mode diagnostic status	
	$B_{3...0}$	HV4 Fixed/Step Mode diagnostic status	
14	$B_{7...4}$	Serial/Remote/Local/Profibus diagnostic status	
	$B_{3...0}$	Not used	

Orderable Parts

Tab. 26

Part	Description
Controllers	
829-9010	4UHV with 1 channel 200 W Negative with profibus interface
829-9011	4UHV with 1 channel 200 W Positive with profibus interface
829-9020	4UHV with 2 channels 200 W Negative with profibus interface
829-9021	4UHV with 2 channels 200 W Positive with profibus interface
829-9100	4UHV with 1 channel 120 W Negative with profibus interface
829-9101	4UHV with 1 channel 120 W Positive with profibus interface
829-9200	4UHV with 2 channels 80 W Negative with profibus interface
829-9201	4UHV with 2 channels 80 W Positive with profibus interface
829-9400	4UHV with 4 channels 80 W Negative with profibus interface
829-9401	4UHV with 4 channels 80 W Positive with profibus interface
829-9210	4UHV with 2 channels 80 W Negative + 1 channel 200 W Negative with profibus interface
829-9211	4UHV with 2 channels 80W Positive + 1 channel 200 W Positive with profibus interface
829-9022	4UHV with 1 channel 200 W Positive + 1 channel 200 W Negative with profibus interface
829-9402	4UHV with 2 channels 80 W Positive + 2 channels 80 W Negative with profibus interface
829-9212	4UHV with 2 channels 80 W Positive + 1 channel 200 W Negative with profibus interface
829-9213	4UHV with 2 channels 80 W Negative + 1 channel 200 W Positive with profibus interface
929-9010	4UHV with 1 channel 200 W Negative
929-9011	4UHV with 1 channel 200 W Positive
929-9020	4UHV with 2 channels 200 W Negative
929-9021	4UHV with 2 channels 200 W Positive
929-9100	4UHV with 1 channel 120 W Negative
929-9101	4UHV with 1 channel 120 W Positive
929-9200	4UHV with 2 channels 80 W Negative
929-9201	4UHV with 2 channels 80 W Positive

929-9400	4UHV with 4 channels 80 W Negative
929-9401	4UHV with 4 channels 80 W Positive
929-9210	4UHV with 2 channels 80 W Negative + 1 channel 200 W Negative
929-9211	4UHV with 2 channels 80W Positive + 1 channel 200 W Positive
929-9022	4UHV with 1 channel 200 W Positive + 1 channel 200 W Negative
929-9402	4UHV with 2 channels 80 W Positive + 2 channels 80 W Negative
929-9212	4UHV with 2 channels 80 W Positive + 1 channel 200 W Negative
929-9213	4UHV with 2 channels 80 W Negative + 1 channel 200 W Positive
HV Cables	
929-0705	HV bakeable cable, radiation resistant, 4 meter
929-0707	HV bakeable cable, radiation resistant, 7 meter
929-0708	HV bakeable cable, radiation resistant, 10 meter
929-0709	HV bakeable cable, radiation resistant, 20 meter

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.

1) Complete the attached Request for Return form and send it to Agilent Technologies (see below), taking particular care to identify all products that have pumped or been exposed to any toxic or hazardous materials.

2) After evaluating the information, Agilent Technologies will provide you with a Return Authorization (RA) number via email or fax, as requested.
Note: Depending on the type of return, a Purchase Order may be required at the time the Request for Return is submitted. We will quote any necessary services (evaluation, repair, special cleaning, eg).

3) **Important steps for the shipment of returning product:**
   - Remove all accessories from the core product (e.g. inlet screens, vent valves).
   - Prior to shipment, drain any oils or other liquids, purge or flush all gasses, and wipe off any excess residue.
   - If ordering an Advance Exchange product, **please use the packaging from the Advance Exchange to return the defective product**.
   - Seal the product in a plastic bag, and package product carefully to avoid damage in transit. You are responsible for loss or damage in transit.
   - Agilent Technologies is not responsible for returning customer provided packaging or containers.
   - **Clearly label package with RA number**. Using the shipping label provided will ensure the proper address and RA number are on the package. Packages shipped to Agilent without a RA clearly written on the outside cannot be accepted and will be returned.

4) Return only products for which the RA was issued.

5) **Product being returned under a RA must be received within 15 business days.**

6) **Ship to the location specified on the printable label, which will be sent, along with the RA number, as soon as we have received all of the required information.** Customer is responsible for freight charges on returning product.

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

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

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

Agilent Technologies

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

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

1) CUSTOMER INFORMATION

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

2) PRODUCT IDENTIFICATION

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

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

3A. ☐ Non-Billable ☐ Billable ➡ New PO # (hard copy must be submitted with this form):

3B. ☐ Exchange ☐ Repair ☐ Upgrade ☐ Consignment/Demo ☐ Calibration ☐ Evaluation ☐ Return for Credit

4) HEALTH and SAFETY CERTIFICATION

AGILENT TECHNOLOGIES CANNOT ACCEPT ANY PRODUCTS CONTAMINATED WITH BIOLOGICAL OR EXPLOSIVE HAZARDS, RADIOACTIVE MATERIAL, OR MERCURY AT ITS FACILITY.
Call Agilent Technologies to discuss alternatives if this requirement presents a problem.

The equipment listed above (check one):

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

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

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

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

_____

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

Print Name: **Authorized Signature: .....** **Date:**

5) FAILURE INFORMATION:

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

I understand and agree to the terms of Section 6, Page 3/3.
Print Name: **Authorized Signature: .....** **Date:**

Agilent Technologies

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

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

TURBO PUMPS and TURBO CONTROLLERS

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

ION PUMPS/CONTROLLERS

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

VALVES/COMPONENTS

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

LEAK DETECTORS

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

INSTRUMENTS

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

SCROLL AND ROTARY VANE PUMPS

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

DIFFUSION PUMPS

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

Section 6) *ADDITIONAL TERMS*

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

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

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